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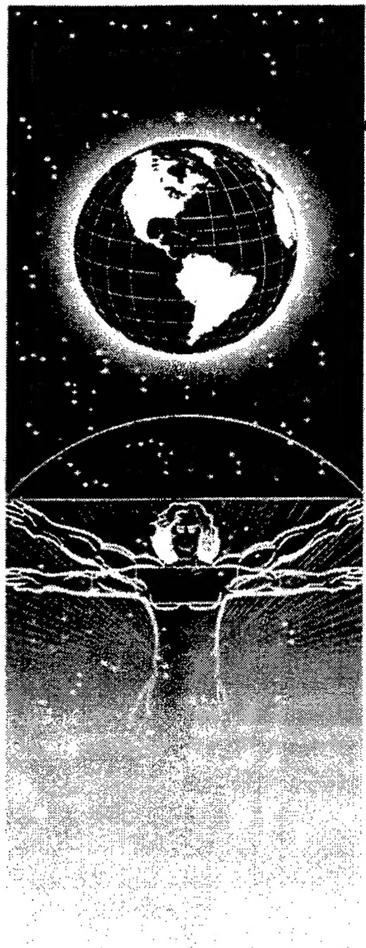

UNITED STATES AIR FORCE RESEARCH LABORATORY

Depot Operations Modeling Environment

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This report has been reviewed by the Office of Public Affairs (PA) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

FOR THE COMMANDER

For

JAY KIDNEY, Lt Col, USAF, Chief
Deployment and Sustainment Division
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13. ABSTRACT *(Maximum 200 words)*

The Depot Operations Modeling Environment (DOME) system aids in the design and modeling of Air Force logistics processes between dispersed groups and installations. It provides new communications capabilities to improve the discussion and refinement of process models and to improve the coordination of their implementation and includes state of the art collaborative process modeling tools and methods. The system relies heavily on an existing commercial-off-the-shelf (COTS) product, GroupSystems®, as an underlying infrastructure. Developed for the DOME project, many of the tools extend the capabilities of the COTS tool and offer greater functionality. The DOME effort was characterized by four major components: 1) installation of a collaborative environment establishing connectivity between Air Force depots and wing customers (GroupSystems running distributed on a Citrix WinFrame® server and video-teleconferencing), 2) distributive process modeling tools, 3) artificial intelligence facilitation tools and methods, and 4) templates and wizards (ActionPlanner and SenseMaker) to facilitate the use of collaborative software tools in strategic planning and analysis. In addition, a methodology for using the tools has also been developed and tested. Under the DOME Technology Demonstration, the systems have been successfully assembled and field tested at the Warner-Robins ALC, Robins AFB, Georgia and the 366th Wing at Mountain Home AFB, Idaho.

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PREFACE

This document provides a description of the Depot Operations Modeling Environment (DOME) methodology developed under contract F41624-96-C-5001, funded by the Air Force Research Laboratory, Human Effectiveness Directorate, Sustainment Logistics Branch, Wright-Patterson Air Force Base, Ohio 45433, under the technical direction of Mr. James McManus. DOME aids in the design and modeling of processes between dispersed groups and installations by providing new communication capabilities to improve the discussion and refinement of process models and to improve the coordination of their implementation. DOME also includes state-of-the-art collaborative process modeling tools and methods. The prime contractor for DOME is The Center for the Management of Information (CMI) at the University of Arizona in Tucson. The principal investigator was Dr. Jay F. Nunamaker Jr. In addition to the authors listed on the cover of the report, we would like to acknowledge Ventana Corporation for their technical expertise related to GroupSystems and the following individuals who developed the source code for the collaborative process modeling tool:

Mr. Bill Saints

Ms. Lina Zhou

Mr. Dongsong Zhang

Mr. Duffy Gillman

Mr. Conan Albrecht

Mr. Jian Xu

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FIGURES AND TABLES

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1.0 INTRODUCTION

Air Force logistics decision-makers are faced with declining manpower and shrinking material budgets, as well as demand for flexible, cost-effective operations. Reduced business-cycle times and improved process efficiencies are becoming increasingly critical. In addition, logistics units such as depots are facing increased competition from commercial firms for aircraft repair and maintenance business. One response to this dilemma is embodied in the concept of "Lean Logistics" with its associated components such as two-level maintenance and just-in-time inventory control. However, past experience suggests that while significant improvements are sometimes achievable, improvements require detailed analysis and planning. Potential process changes should be carefully evaluated by groups of key stakeholders. Thus, the means to obtain effective involvement during process analysis is essential. The Depot Operations Modeling Environment (DOME) system is designed to support such an effort.

The goal of the DOME system is to aid in the design and modeling of Air Force logistics processes between dispersed groups and installations. It provides new communications capabilities to improve the discussion and refinement of process models and to improve the coordination of their implementation. It also includes state of the art collaborative process modeling tools and methods. The system relies heavily on an existing commercial-off-the-shelf (COTS) product, GroupSystems®, as an underlying infrastructure. Many of the tools developed for the DOME project extend the capabilities of the COTS tool and offer greater functionality.

The DOME effort is characterized by four major components: 1) installation of a collaborative environment establishing connectivity between Air Force depots and wing customers (GroupSystems running distributed on a Citrix WinFrame® server and video-teleconferencing), 2) development of distributed process modeling tools, 3) development of artificial intelligence facilitation tools and methods, and 4) development of templates and wizards (ActionPlanner and SenseMaker) to facilitate the use of collaborative

software tools in strategic planning and analysis. In addition to the software tools developed, a methodology for using the tools has also been developed and tested.

The DOME system has been successfully installed and demonstrated at the Warner-Robins ALC, Robins AFB, Georgia and the 366th Wing at Mountain Home AFB, Idaho.

2.0 DOME ENVIRONMENT

2.1 DOME System Description

The DOME system has been designed to provide an easy to manage setting for distributed collaboration. The basic components are a Citrix WinFrame Server, a Web Server, client computers, and various software components.

Citrix WinFrame Server

The Citrix WinFrame Server is the key component in running distributed GroupSystems sessions. The WinFrame software allows users to access the server via the Internet, providing a mechanism to use GroupSystems in a distributed way. This server should be a Pentium II class computer running Citrix WinFrame Server 1.7. The WinFrame software requires 16 megabytes of memory for the operating system and an additional 8 megabytes of memory for each user. The total amount of memory will depend upon the number of WinFrame clients desired. The server should have a minimum of 4 gigabytes hard disk storage.

Web Server

The Web Server is used to house the Collaborative Process Modeler. This server should be a Pentium II class computer running Microsoft® Windows NT® Server 4.0 and NT Server's built-in Web server software, Internet Information Server 4.0 (IIS). The minimum memory required for the server is 64 megabytes with at least 4 gigabytes of hard disk storage. Though other server software can be used for a Web Server, the DOME experience has shown that NT Server 4.0 is very reliable and easy to maintain. Additionally, the IIS software makes it easy to share documents and information across the Internet and is the fastest Web server for Windows NT Server. This combination of Web and operating system services makes it possible to deploy scalable and reliable Web-based applications.

Client Computers

The client computers, those used in the collaborative meeting rooms or at individual desktops, should be able to connect to the Internet and run Microsoft Internet Explorer

software. This provides a wide-range of flexibility for installations with older hardware configurations (e.g., 486 class machines running Windows 3.x). The recommended client computer is a Pentium II class computer running Microsoft Windows 95/98 or NT Workstation 4.0, at least 32 megabytes of memory, and 2 gigabytes of hard disk storage.

Software

Each client computer should have Microsoft Internet Explorer 4.01 SP1 software installed. This is the only Internet browser supported by the Collaborative Process Modeler tool. GroupSystems for Windows 1.1, from Ventana Corporation, should be installed on the WinFrame Server. Additionally, those computers performing desktop videoconferencing should have the appropriate drivers and software installed, depending on the type of desktop camera being used.

2.2 DOME Methodology

The objective of the Depot Operations Modeling Environment (DOME) project was to develop and demonstrate distributed groupware technologies that support anytime/anyplace planning and decision making within and between the logistics support groups at the wing and depot. To this end, a methodology was developed to guide the application of DOME to AF logistical processes. Collaborative tools and technologies were necessary to involve potential users in decision making and problem definition activities. Given the complexity of logistics, all these capabilities were attained through the application of effective collaborative (DOME) methodologies and tools. The methodology involves technology developed at the CMI which is a network-based set of flexible software tools which incorporate basic problem-solving techniques such as brainstorming, idea organization, voting, issue analysis, policy formation, prioritization of ideas, and stakeholder identification. Electronic communications allow all group members, whether or not they are distributed, to contribute to the group's task both simultaneously and asynchronously. The approach integrated current methodologies in use at the University of Arizona and elsewhere into a single, comprehensive DOME methodology:

1. Group-enabled analysis of business process and context
2. Group-enabled monitoring of implementation outcomes
3. Collaborative strategic planning
4. Development of advanced facilitation tools and methods

Field studies were conducted as part of this research and are described in the appendices of this report. An Air Force base in Idaho and a depot in Georgia were synchronously connected using audio teleconferencing, video conferencing and data exchange to develop a process model to improve aircraft repair. Next, an Air Force base, depot, headquarters, and project managers located in five different states collaborated asynchronously using data and telephone exchanges to verify the process model created in the previous study.

Collaborative meeting technology was also used to expedite and enhance the Air Force strategic planning process. Strategic planning is seen as an essential part of establishing an organization's direction. Due to the Government Performance and Results Act (GPRA) mandate that all government organizations use strategic planning, more emphasis will be directed toward the topic as organizations search on the best methods to incorporate it. Although strategic planning is utilized throughout the Air Force today in various forms, sessions can become time consuming without clear direction or structure to the planning. Computer-supported strategic planning is one avenue of making effective use of technology to better the strategic planning process. This research implements a group support system (GSS) as a facilitation tool to improve the strategic planning process. Implementation of GroupSystems on the strategic planning process was expected to: (1) improve the quality of the strategic plan, (2) reduce time to completion, (3) increase satisfaction with the process, and (4) increase commitment to the strategic plans developed.

2.3 Feasibility of Multimedia and Other Information Technologies

The flight line is a hectic and complex environment that requires collaboration between Flights, across Squadrons, and with other Air Force installations. Future AF flight lines

may consider using wireless computer, audio, and video technology to improve the logistics processes, such as the AFTO 107 process used in the Technology Demonstration phase of DOME. The following would be an ideal scenario using technology with the AFTO 107 process. First, a technician working on the aircraft would recognize a potential AFTO 107. Second, the airmen moves 10 to 20 feet to a mobile tool box imbedded with a laptop and fills out a World Wide Web based AFTO 107 with an attached digital photograph or video clip to provide additional information on the problem. Third, the technician electronically sends the potential AFTO 107 a supervisor whose digital or iridium (for global TDY) phone shows the message. The supervisor then reviews the AFTO 107 and passes the TO on to ACC and the depot, replies back to the technician for more information, or rejects the AFTO 107 with explanation. Fourth, when the depot and ACC get the AFTO 107 an electronic acknowledgement is automatically sent to the supervisor. If engineers require additional information supervisors can be contacted via the same technology the technical used. If required the supervisor, can go to the aircraft to use a digital video camera to show and tell the engineer about the problem in near real-time over the web. If time zones are an issue, the supervision and engine can send the digital video and audio for asynchronous interaction. The same type of interaction can happen with the supervisor and the technician if required. Finally, the system updates all parties on where an aircraft is in AFTO 107 via the World Wide Web and the digital communication system.

Much of the technology required to do make the above scenario a reality already exists. CMI tested wireless 10MB communications systems. The wireless systems tested were an IR and RF-based systems from JVC Wireless Networks and Clarion Wireless LAN Division respectively.

<u>Infrared (IR) Component</u>

The components of the IR system consisted of two JVC VIPSLAN-10 OA-N101U Stations (arranged in a station-station configuration) and two JVC VIPSLAN-10 OA-TU10U T-Adapters and two 9 Vdc power adapters.

The OA-N101U Stations are able to, once mounted, search for each other and establish a 10 Mbps IR communications channel that is then easily interfaced to an Ethernet 10 Base-T hub or a computer. The range of separation between two stations can be up to 20m. The OA-TU10U T-Adapter provides a simultaneous interface of a signal line and power to the station unit.

Radio Frequency (RF) Component

The components of the RF system consisted of the following:

a. Two Clarion M10 JX-4000F-C RF transceivers;

b. Two 6 VDE power adapters;

c. Two Hyperlink antennas; and

d. Two smaller omni directional antennas.

The JX-4000F-C is a wireless transceiver that provides a reliable, secure and long range 10 Mbps burst data rate to support wireless connections in IEEE 802.3 and Ethernet II (TCP/IP) LAN. The transceivers are also easily interfaced to an Ethernet 10 Base-T hub.

Installation

The wireless systems intended for test purposes would link the one group facility (A) with another (B). On the 24 - 25 Jun 98 we did the installation of the IR wireless components. The two station units were mounted on the walls outside the group facility rooms. Power was supplied to the units and a single Ethernet Cat 5 cable was run from the each of the station units to CISCO 1900 series hubs respectively located in each room.

On the 10 - 11 Jul 98 welders mounted two supporting brackets on the walls in close proximity to the IR wireless components, which were intended to support the RF wireless components. On 19 Jul 98 the RF the test team installed wireless components.

Both of the wireless systems make use of the Ethernet cabling leading to each of the respective spaces and therefore were tested separately.

In order to fulfill evaluate a requirement, INTRNET access was established in one location B. A passive tap was established by temporarily interrupting the fiber optic link and inserting two fiber optic transceivers (CentreCOM MX26F) that are connected to an Elite 351ZTP 10 Base-T concentrator. This in effect provides INTRNET access within the location B. In order to provide location A with the same capability (once the wireless systems are established), an Ethernet cable was run from the Elite concentrator to the CISCO hub. The connectivity was confirmed by using a laptop to issue a "ping" command to the INTRNET servers.

Within location B the 100 Base-T Group Systems LAN was connected (through a single Cat 5 crossover cable) to the 10 Base-T CISCO hub of the wireless system. The features of the CISCO hub make it possible to bridge between a Fast Ethernet system (100 Base-T) and the 10 Base-T system.

Testing Details

Ideally to provide a comprehensive assessment of the IR and RF wireless technologies, testing should comprise of stressing CSMA/CA, bandwidth (Bw) capacity and bit error rate and comparing FHSS, DSSS, and IR. Unfortunately due to the lack of test equipment available the sole criterion for assessment is the Bw capacity of each of the systems. This in itself is qualitatively assessed as testing is carried out through the use of software programs and tools. The minimum Bw sought is the amount required to effectively transfer data, stream both audio and video.

To facilitate streaming audio and video a PC camera, ComperEyes/PCI and sound cards were installed in Station 5 of the Group Systems LAN within the on location. The software provided to aid in the audio/video testing is CU-SeeMe 3.1 from White Pines Software.

IR Wireless System

Once location A had access to the INTRNET and the two hubs within the other location were connected, a notebook running Windows NT 4.0 was used to issue a "ping" command to the two INTRNET servers on board. After this effort was found to be

successful, an attempt was made from Station 5 in location B to connect with the Netscape homepage on the Internet that also proved successful. To test the data transfer capability the latest beta version of Netscape Communicator was downloaded. The browser was successfully downloaded and subsequently installed in all stations within the LAN. At that point, all stations were able to access the Internet concurrently.

The rate at which the data transfer took place was indicative of normal transfer rates experienced with a 28.8/33.6Kbps modem connected through a normal telephone connection.

As previously indicated, a PC camera with associated software and hardware was installed in Station 5 of location B. It was then determined amongst the test team that making use of a software package capable of performing video conferencing would provide an indication of the capability for the IR system to handle streamed audio and streamed video. Since Microsoft offers free use of NetMeeting, this would be the vehicle to test the wireless systems vice using CU-SeeMe 3.1.

NetMeeting 2.1 was subsequently downloaded from the Microsoft Web site and installed on Station 5 of location B. NetMeeting was also downloaded and installed on the unclassified Toshiba computer in location A. The first videoconference was established using Internet Protocol. Good quality video viewing was present, but problems were experienced using the audio portion. No audio was received at Station 5; whereas, audio was received at location A. The audio received was clear but feedback was evident. The audio/video setup feature within NetMeeting was performed on the Station 5 and proved correct. The same test was performed at location A's end and it was determined that the audio record function was not functioning. Therefore speech is not being relayed from the monitor's microphone onwards for subsequent processing. This has been noted for further investigation/rectification.

A second computer (Toshiba 440CDT notebook) was subsequently integrated into the test process. An Intel USB Camera II (for Intel ProShare - Technology) was installed on

the notebook and NetMeeting was downloaded and installed. NetMeeting was set up correctly and a videoconference with Station 5 was initiated.

During the conduct of this videoconference the audio and video elements were of very good quality. Audio feedback was present and it was noticed that regenerative feedback could easily occur and disrupt the audio portion of the connection. The software settings for the microphone and speaker volumes must be set with care in order to prevent this feedback. To further test the system, the remaining features of NetMeeting (application-sharing, whiteboard and chat) were used. The chat and white boarding were conducted and then an MS Word document was shared between the test locations in a collaborative effort. All these functions were conducted while maintaining the audio and video link.

The successful result of this test was the major milestone the test team wanted to achieve during the wireless evaluation. Further testing with NetMeeting is possible where a larger number of people participating in a meeting will challenge the available network bandwidth. This was not attainable during this evaluation due to the lack of PC cameras available.

One additional milestone was achieved in that the test team was able to successfully incorporate a distributed group member into a GroupSystems session. The client was located in the location A and the member was able to participate in a group session using NetMeeting audio/video capability and enter comments into the remote GroupSystems session.

RF Wireless System

A simple bench test was attempted to determine connectivity with the RF system. The XJ-4000F-C transceiver was connected to an antenna via the SMA female connector and to a hub via the attachment unit interface (AUI) port. A notebook was then connected to the hub and the system was powered up. Another identically configured sub-system was erected. The method of testing connectivity was to issue a "ping" command from notebook to another, which subsequently proved correct. The next step in testing was to

separate the two sub-systems: one situated in the location with the other situated outside of location door. The associated connectivity test proved correct (issuing a "ping" command) with the following observations:

a. Special care in aligning the small antenna must take place in order to gain consistent connectivity; and

b. The smaller antenna proved more reliable than the larger Hyperlink antenna sub-system.

The RF components were dismantled and re-assembled on the platforms mounted on the walls. When the wireless system was then powered up, a lack of connectivity was discovered. As mentioned above concerning antenna alignment, a great deal of effort and care was expended attempting to align the antennas in various positions to no avail. It is important to note that the distance between the antennas was less than 10m with no obstructions.

The RF system was dismantled and bench tested again to confirm no unserviceable components. As no faults were discovered the two subsystems were separated again to positions within the one location and outside of the other. Once again a great deal of attention was given to aligning the antennas. Continuous connectivity was quite difficult in attaining, but at one point a 5-minute period of connectivity was established. During this time access to the Internet was gained and via the ABCNEWS.com Web site the downloading of video and audio news clips was successfully conducted.

After consulting with personnel from Clarion, configurations of the transceivers were confirmed correct while reasons for lack of continuous connectivity remain unknown. A final attempt to test the RF system was conducted using software provided by Clarion. Approximately approximately 10m separated the two sub-systems in the spaces adjacent to the JMC. The software was run and the transceiver and hub lamp indications were noted as follows:

a. Transmitting sub-system:

(1) Hub activity lamp consistently indicated data traffic, and

(2) XJ-4000F-C transceiver transmit lamp brightly lit

b. Receiving sub-system:

(1) Hub activity lamp consistently indicated no data traffic, and

(2) XJ-4000F-C transceiver receive lamp intermittently lit with low brilliance

The software (Traffic.exe) provided by Clarion essentially allows a computer to instigate a constant stream of data for the purposes of testing the RF system or align the associated antennas. When the antennas were optimally aligned the above lamp indication was noted. Since all units were assumed to function correctly one can speculate that the steel walls of the space were reflecting the signal and possibly interfering with direct line of sight reception. The evidence for this is provided by the receiving activity of the transceiver while the hub registered no data activity, thus indicating the possible existence of errors in reception.

It was decided to cease further RF wireless testing and advise Clarion Wireless LAN Division of our results.

Noteworthy Concerns

During the "hotwork" activity in spot welding the brackets in the vicinity of the IR communications link was interrupted which required re-alignment in order to re-establish link. This happened twice during the mounting of the two brackets. It is therefore advisable not to run the IR wireless in areas of excessive heat.

While attempting to download audio/video clips from various Internet Web sites, warnings were presented relating to network transport. When investigating these warnings the end result is that TCP network transport will not function due to firewall restrictions. Current policy in place, which precludes the ability to use collaborative audio/visual Internet communications beyond an installation, is a potential concern in the future.

Due to the nature of transmission used in the RF wireless, 2.4 GHz at 25 mW, the operation of the RF wireless falls into the EMCON policy. The reasoning for this is that

regulations preclude the use of electronic systems that emit RF radiation during the uploading/downloading of ammunition. Although the power at which the RF wireless operates is extremely low, the authorities choose to error on the side of safety. Until this can be resolved, it is unadvisable to further investigate the employment of RF wireless systems at installations employ electrically fired ammunition.

Accomplishments

During the conduct of the wireless investigations, the following accomplishments have been attained:

- Location A connectivity to the INTRNET
- Location B connectivity to the INTRNET
- Tested two wireless LAN systems: IR system from JVC and RF from Clarion
- Established collaborative NetMeeting connectivity between location A and location B via the IR wireless system
- Established a distributed client for Group Systems in the location A.

Recommendations

The recommendations resulting from this investigation are as follows:

- Pursue further IR wireless investigation possibly with COTS products available from venders such as JVC.
- If RF wireless investigations are pursued it is recommended the emission control policy is ratified to allow restriction-free use of the RF wireless systems.
- Resolve firewall restrictions that prevent Internet collaborative video conferencing, which extend the capabilities of both location A and B.

2.4 Artificial Intelligence Facilitation and Methodology

Background

Prior work by researchers at the University of Arizona (Orwig, et al., 1994) found significant problems in facilitated meetings. In particular, although participant satisfaction was found to rise during divergent activities such as brainstorming,

satisfaction was found to decline precipitously during subsequent convergent activities such as organizing and voting on the material generated during the divergent activity.

These researchers found that a key reason for declining satisfaction was the amount of time spent organizing the material from the divergent activity. They successfully decreased the time spent organizing material by applying a neural network technique pioneered by Teuvo Kohonen, the self-organizing feature map. This map attempts to show the relationship between comments generated in a brainstorming session on a display resembling a chloropleth map. This work is useful in providing tools for knowledge management to help maintain organizational memory. Output from brainstorming sessions and other electronic meetings becomes more easily accessible because the tool sorts it or categorizes the information into a map of topics relating to a particular question. Users then can more readily find that information in which they are most interested.

While the earlier work succeeded in many ways, certain aspects of the self-organizing feature map left room for further research. First, the technique organizes comments at the intersections of lines arranged in a two-dimensional grid, permitting only an extremely coarse and often inaccurate portrayal of the similarity relationships between comments. Second, users are often baffled by the map's interface, and are rarely able to use it without instruction. Third, although the map can be generated quickly enough to provide a time saving over purely manual organization, practical use would benefit from a considerably faster process. Finally, the earlier work did not address the problem of preprocessing the comments, using only one method, automatic indexing, to prepare comments for mapping. Because they only used one input method, the researchers had no idea whether automatic indexing performed better than other available methods.

The present work provides tools to aid facilitation that aim to overcome some of the limitations of the earlier tools. We have also tested the newer tools to validate the technique and to explore comments generated during the course of the DOME project.

The Tools

Several tools were developed in the course of the research, while several tools developed separately by the University of Arizona AI Group were used in this research. The following tools were used in the order listed below.

Preprocessors

Two different preprocessors were used to transform comments (output from GroupSystems) into lists of terms suitable for analysis. The first was the automatic indexer previously developed by Dorbin Ng and other researchers in the AI Group. This tool converts comments into single-word and multi-word terms after filtering out stop-words (common words that don't differentiate comments). The automatic indexer does not distinguish between parts of speech represented by terms, which are developed with a moving window technique (a "moving window" is passed across text to create keywords).

The second preprocessor, the Arizona Noun Phraser, is a more recent development in the AI Group. This system makes a strong guess at the part of speech represented by a single- or multi-word phrase and captures only noun phrases. We compared this to the earlier approach, believing that this approach would result in better representation of comments, but were surprised by the results.

DISSIM

This simple tool calculates the "dissimilarity" between comments based on classic ideas of document similarity from information retrieval. This dissimilarity is based on the Jaccard score described in information retrieval literature (Tversky, 1978). The Jaccard score calculates similarity, Σ, between two objects x and y as

$$\Sigma = \frac{x \cap y}{|x| + |y| - |x \cap y|}.$$

DISSIM calculates the similarity between comments by the above formula, using term lists generated by the previous step. Like most similarity measures, the Jaccard score

provides a numerator to represent the number of terms in common between the two comments and a denominator to scale the results by the total number of terms in the two comments. Hence, if two comments share only the term "lead time" and contain no other terms, they are judged to be more similar than two comments that share the term "lead time" but also each have 3 terms not in common.

The DISSIM tool stores the values

$$1 - \Sigma_{mn}$$

scaled to a 5 digit integer for each row m and each column n of the similarity matrix. This produces a dissimilarity matrix, analogous to a city distance table, with the important exception that some of the entries are contradictory. For instance, imagine a city distance table where New York lies between Boston and Washington, but Boston lies between New York and Washington. Such a city distance table could not be represented on a map without some way to resolve these contradictions. This helps motivate the next step, which resolves the contradictions in a manner that is in some sense optimal.

MDScaler

This tool uses isotonic regression and conjugate gradient descent algorithms to perform non-metric multidimensional scaling as described by Kruskal (Kruskal, 1964). The output is in the form of coordinates for a map of comments in one, two, or three dimensions. The 3D output takes the form of VRML tags, while the 2D output is suitable for either of the two Java interfaces described below. The 1D form is not for display but is used for categorization.

This tool begins by assigning optimal distances between comments i and j such that

$$\hat{d}_{ij} \le \hat{d}_{i'j'} \leftrightarrow \hat{\delta}_{ij} < \hat{\delta}_{i'j'}$$

or, in words, the optimal distance between two objects is less than or equal to the optimal distance between two other objects if and only if the optimal dissimilarity between those two objects is strictly less than the optimal dissimilarity between the other two objects. Having found these optimal distances, the tool finds coordinates in 1, 2, or 3 dimensions that minimize

$$\sqrt{\frac{\sum\left(d_{ij}-\hat{d}_{ij}\right)^2}{\sum d_{ij}^2}},$$

the STRESS function originally defined by Kruskal (Kruskal, 1964). Although this function has been the subject of a never-ending stream of scholarly articles in recent years, no one has satisfactorily demonstrated a function that strictly dominates it. We have chosen to implement the original function, albeit in a modular way that can be easily replaced with a superior replacement, should one emerge.

Oned

This new tool (pronounced "wun-dee") is used to categorize comments based on the output of 1D MDScaler. Currently, it finds the largest gaps in distance in the 1D configuration, and records the categorizations that result from dividing the comments at these gaps. The output is a list of $n-1$ categorizations given input of n coordinates.

Interfaces

We implemented two interfaces in Java. The first interface provides three windows and several controls. The main window displays the map, showing comments as colored dots. The user may select comments by clicking on dots or dragging a rectangle around a group of dots. A second window displays the text of currently selected comments, shaded with colors that match the dot colors. A third window displays the colors in use and permits the user to assign a name to the categories represented by these colors.

The second interface differs in both design and implementation. This interface uses more recent Java tools to ease further development and is generally more robust. Although it has been designed to permit more flexible development, only one major addition has been

implemented to date. This addition permits animation of the categorizations found by Oned. In future, it will support automatic naming of categorizations.

Results

Testing

Initial testing of the system is described in detail in (McQuaid, Ong, Chen, and Nunamaker, 1999). This testing involved an experiment with 60 users, 30 using the actual system and 30 using a "placebo" system to determine whether the system could provide statistically significant benefits to facilitators.

More recent testing has involved processing of comments generated in the DOME project. For these tests we have generated maps based on both preprocessors and compared them with the aid of a domain expert. Our evaluation of this testing is reported below.

Evaluation

Our system does a simple form of machine learning, described in the machine learning literature as statistical learning, specifically multidimensional scaling. The advantage ascribed to this technique in AI literature is that it remains immune to the prejudices of the researcher in finding patterns. It finds patterns in the most rudimentary way: translating the dissimilarities described above into distances on (for instance) a 2D map. The disadvantage of this approach is that the patterns found may have no semantic content. For instance, the tool may find that two comments containing the term "rock" are similar, even though one comment addresses music and the other addresses geology. The system does not do word sense disambiguation. This simplicity can have serendipitous consequences. For instance, the system clustered "group memory" and "organizational memory" in close proximity due to the common term "memory." This was a desirable but accidental result, since the system had no thesaurus to refer to find a link between "group" and "memory."

We implemented two interfaces in Java. The first was designed to validate the system by allowing users to interactively categorize comments on a pre-built map. This interface

can also be used by a facilitator to more quickly categorize comments than is possible using a purely manual approach.

In Figure 1 we see the first Java interface using comments preprocessed by automatic indexing. Two problem comments are selected in this figure. Note that the comments labeled, "Problems" are more dispersed than the comments labeled, "Solutions." The language of the problem comments is actually more varied than the language of the solution comments.

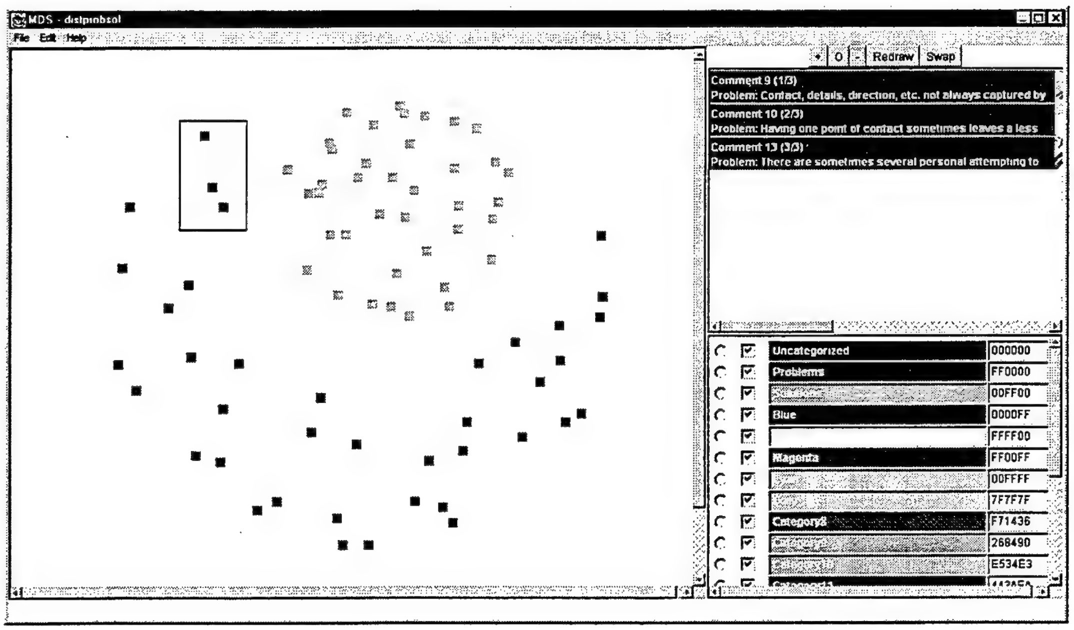

Figure 1. Java Interface (1) with Comments Preprocessed by Automatic Indexing

In Figure 2 we see the first Java interface using comments preprocessed by noun phrasing. One solution comment is selected in this figure. The configuration of the Problem comments and the Solution comments is notable in that they form similar, parallel ellipses. A domain expert who reviewed the output indicated that he observed substantial similarities between Problem and Solution comments in corresponding locations.

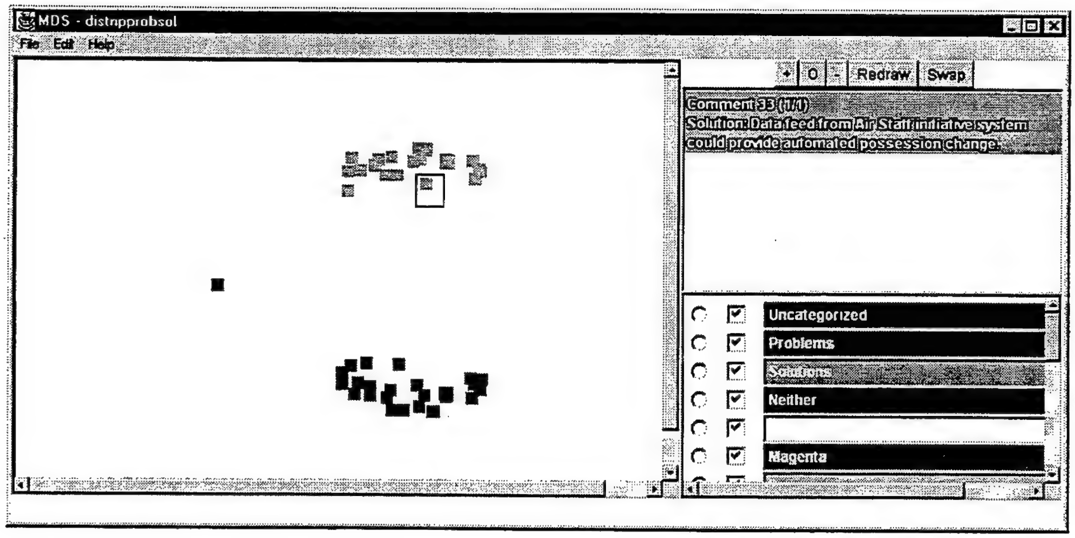

Figure 2. Java Interface with Comments Preprocessed by Noun Phrasing

In Figure 3 we see the second Java interface using comments preprocessed by automatic indexing. Four comments in the upper right corner (surrounding the cursor) are selected. These comments concern the term "goals" which is peripheral to the main discussion of change management. An important feature of this system is that it separates comments that are peripheral (in the sense of sharing no keywords) to the main text (as represented by the large semicircular border). The ability to distinguish this kind of peripheral material was important to users of earlier tools, so in moving to different techniques, it would be easy and unfortunate to lose this feature.

Our testing sought to verify our intuition that one type of preprocessing would by preferred by users. Our intuition was contradicted by the reaction of a domain expert, who preferred to see multiple views, i.e., the two views shown in Figures 1 and 2. The expert pointed out that discussion participants sometimes expressed agreement with comments by repeating predicates (or predicate fragments) in other comments. By restricting the processing to noun phrases, the domain expert felt that we showed some important associations, but missed some associations, specifically between predicates.

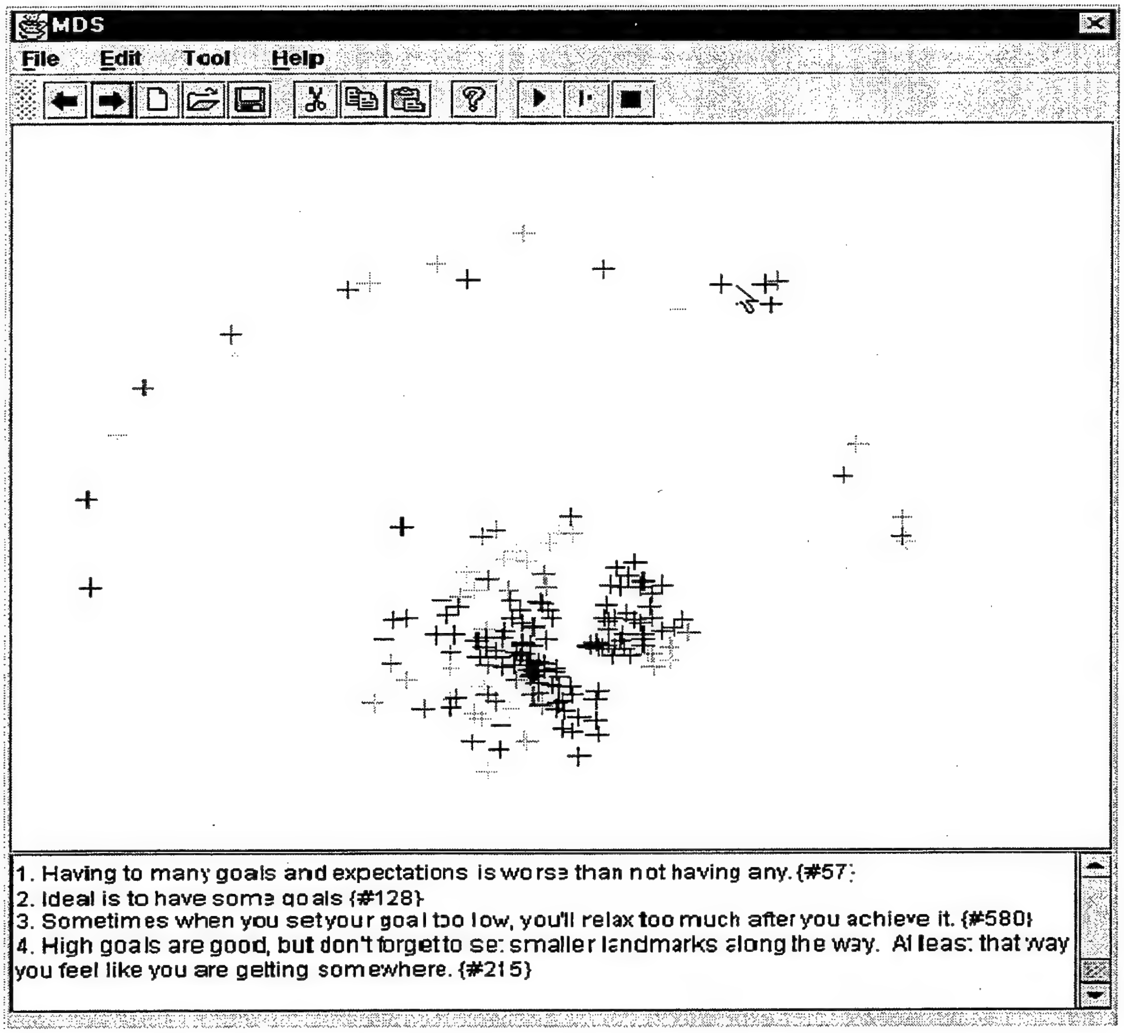

Figure 3. Java Interface (2) with Comments Preprocessed by Automatic Indexing

2.5 Development of Distributed Process Modeler

Awareness of the need for business analysis has grown faster than the evolution of tools to support the collaborative development of business models. Appropriate models may support conceptualization, communication, analysis, and design of improved business processes and information systems. In addition, involvement of key personnel during model development and analysis is important for model accuracy as well as for buy-in. Traditionally, however, models have been developed by individuals and small groups because of the complexity and difficulties involved in the modeling process.

Researchers at the University of Arizona have worked for the past several years creating specialized electronic meeting systems (EMS) tools and methods to support the development of various types of business models. These tools include Activity Modeler, for developing IDEF0 activity models, and Group Data Modeler, for developing enterprise data models. These tools and methods were designed to effectively involve users in the development of business models and are an important part of the Collaborative Software Engineering Methodology (CSEM). One key aspect of CSEM describes the use of scenarios to capture business process information and to develop process models. Although there are single-user process modeling tools available, there are not any tools specifically designed to support collaborative process modeling. This section discusses the creation of the distributed Process Modeler (PM) tool, which was developed to support this aspect of CSEM.

2.5.1 Background

Previous research in the development of IDEF0 activity models showed that these models were very well suited for describing "what" an organization does, but lacked some important details such as timing and sequence of activities, and decision logic. Further research determined that business process models could be used to capture this additional information.

A process model can be described as "an abstract description of an actual or proposed process that represents selected process elements that are considered important to the purpose of the model and can be enacted by a human or a machine." Process models can be developed from different perspectives such as functional, informational, behavioral, or organizational perspectives. In MIS, some of the earliest process models (e.g., data flow diagrams) took a functional perspective. Business process reengineering and other process improvement initiatives have focused on the behavioral and organizational perspectives for modeling general business processes. These business process models include information such as process sequence, decision criteria, and who performs the process.

In the process modeling world, one of the best specified languages for representing work processes in the physical world is IDEF3. The IDEF3 Process Description Capture Method was developed by Knowledge Based Systems, Inc. (KBSI) for the U.S. Air Force as part of its Integrated Computer-Aided Manufacturing (ICAM) Definition (IDEF) of methods program. The basic process element in IDEF3 is the "Unit of Behavior (UOB)" which describes "things that happen in the world" (e.g., function, process, scenario, activity, action, operation, event, decision, or procedure). The other major IDEF3 constructs are links used to specify relationships between UOBs (e.g., temporal precedence, constraints, object flows, or relationships) and junctions which can be used to 'join' two or more links together or to 'fork' out to links to two or more processes. Junctions are annotated to indicate the timing of forks and joins as synchronous or asynchronous.

As can be seen from the preceding discussion, the IDEF3 process description method provides a comprehensive business process modeling capability. However, University of Arizona researchers' experiences with IDEF3 indicate that some portions, such as the different types of synchronous and asynchronous junctions, may be too complex for users to quickly grasp. Therefore, while the capabilities of IDEF3 served as input to the PM requirements process, several other alternatives were investigated in the search for a simplified, easy-to-use graphical process modeling technique. Petri-nets were eliminated

from consideration since they are even more complex than IDEF3. In contrast, several Unified Modeling Language diagrams seemed to have potential as a user-comprehensible representation.

The Unified Modeling Language (UML) was adopted by the Object Management Group as the standard object-oriented modeling language. The UML standard defines several diagrams for behavior modeling that could possibly be used to graphically portray business processes. UML's Sequence Diagram is commonly used to document use case scenarios. It is a type of interaction diagram that shows the objects participating in a scenario and a time-sequenced list of messages the objects exchange to accomplish the

scenario goal [2]. The Sequence Diagram's focus on objects and messages increases its complexity beyond what is desirable for a simplified, graphical process modeling technique targeted to non-analyst users. UML's State Diagrams are also too complicated for users to independently create without significant training and assistance from analysts or modelers. These technical diagrams are more suitable for use by experienced analysts and developers than by untrained users.

In contrast, UML's Activity Diagram is a greatly simplified version of the UML state diagram that can easily be used for business process modeling. It is designed to provide a dynamic view of a system or process that shows the flow from activity to activity. Officially it is defined as "a special case of a state diagram in which all or most of the states are action states and in which all or most of the transitions are triggered by completion of actions in the source states". The basic constructs in the UML Activity Diagram are defined in Table 1. These definitions seem rather technical, however, they are relatively simple in practice. Activity and action states are directly comparable to IDEF3's UOB and can be used to represent a business process and the steps in the process, respectively.

Activity Diagram Construct	**Description**
Action State	Represents the execution of an atomic action. A simple state with an entry action whose only exit transition is triggered by the implicit event of completing the entry action.
Activity State	Represents the execution of a non-atomic sequence of steps that has some duration. A hierarchical action where an associated sub-activity model is executed.
Pseudo State	Abstraction of different types of nodes in a state machine graph which function as transient points in transitions from one state to another, such as branching and forking, simple transitions, or object flows.

Table 1. UML Activity Diagram Constructs

The user does not even have to be concerned with the difference between activity and action states since they are both represented with the same graphical symbol (Figure 4).

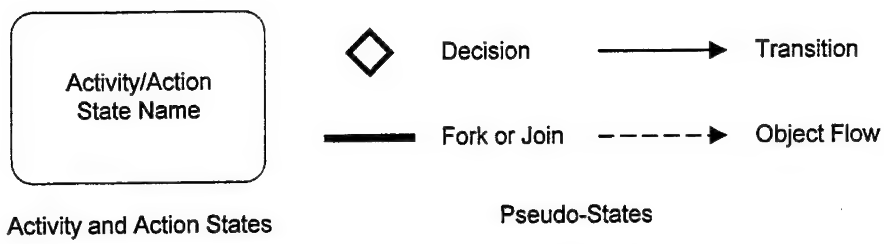

Figure 4. UML Activity Diagram Graphical Symbols

The graphical symbols for pseudo-states are also much simpler than its definition would imply. The decision, fork, and join pseudo-states are simply different types of branches that can occur in process flows and are comparable to IDEF3 junctions. Transitions and object flows represent two types of links between activity or action states.

In summary, both IDEF3 and the UML Activity Diagram satisfy PM's requirement for graphical business process modeling. The basic elements of each are directly comparable. However, because the Activity Diagram has a simpler representation and can be linked to other UML diagrams, it was selected for PM's initial graphical process modeling representation.

2.5.2 PM Systems Development

The goal of this research was to design and develop a new system that provided better support for collaborative scenario and process model development than existing tools. The PM prototype evolved from the lessons learned in previous research [17, 18] and the integration of two DOD funded research prototypes: (1) Process Modeler and (2) Scenario Modeler. Results of this research are presented in the following sections for each of the five stages of the systems development research methodology [24].

2.5.2.1 Construction of a Conceptual Framework

The CSEM scenario framework, collaborative scenario elicitation methodology, and contextual scenario data model developed and revised during previous research served as

the overarching conceptual framework for this research. This framework served as the starting point for investigating the required functionality for the PM prototype. Next, the business process modeling literature was studied to identify alternative approaches for satisfying those requirements. Results of these first two steps were analyzed to develop an integrated scenario and process modeling framework for the PM prototype.

2.5.2.1.1 Core PM Prototype Functionality

The lessons learned from earlier research [17, 18] were combined with previous experiences in developing general-purpose and modeling GSS to identify five core requirements for PM:

1. PM must include all GroupSystems Group Outliner functionality for hierarchically decomposition and commenting on outline items. Users consistently rated Group Outliner very easy-of-use, therefore, Group Outliner served as the baseline for these capabilities.
2. PM must implement the essential features of a modeling GSS including a user-comprehensible interface that focuses on information the user can provide. Lessons learned from development of Activity Modeler and Group Data Modeler were used to guide implementation of this capability.
3. PM must be application-specific and include prompts for scenario and action data included in the contextual scenario data model.
4. PM must provide flexible support for an iterative methodology for collaborative scenario and process model development.
5. PM must include an integrated graphical process modeling capability. Business process modeling approaches were studied to identify alternatives for providing this capability.

2.5.2.1.2 Integrated Scenario and Process Modeling Framework

The initial conceptual framework and data model developed during earlier research were specifically designed to support scenario elicitation. Scenario and process modeling have very different constructs and terminology. These differences had to be reconciled before an integrated scenario and process modeling capability could be included in PM. One of

the first major challenges was to define what the basic components that are successively decomposed to create a PM process model are and what they should be called.

The CSEM specifies that business activities and functions should be decomposed into sub-activities/functions. For each of the sub-activities/functions with system implications, users identify business scenarios, which provide concrete examples of how users currently accomplish those functions. Business scenarios are then decomposed into the specific steps or actions that users perform during those scenarios. Using CSEM as a guideline, the basic PM components could be called activities, functions, sub-activities, scenarios, steps or actions – depending on the level of the decomposition.

From a graphical process modeling perspective, processes are decomposed into sub-processes, which are further decomposed into tasks or actions. The UML Activity Diagram decomposes activity states into action states. Again, the name of the component depends on the level of decomposition. The IDEF3 Process Description Capture Method eliminates this dependency by calling all the basic components at all levels "Units of Behavior" which represent a function, process, scenario, activity, operation, decision, action, event, or procedure.

While the IDEF3 concept provided the simplicity desired for the PM prototype, it was not clear whether all these different components could be consolidated into one generic element. A comparison of data requirements for all levels for both scenarios and processes showed that there was enough overlap to support consolidation into a single basic component with standardized data elements. The other advantages of consolidating into a single component are:

- The abstraction problem (e.g., where one person's scenario is another's step, or where a scenario step in the requirements phase becomes a use case during design) does not have to be dealt with – all components will be the same.
- The user does not have to understand the differences between the separate components.

These advantages, when combined with the results of the data analysis, resulted in the decision to combine all PM components at all levels of decomposition into a single generic component. The next question was what to call this generic component. The IDEF3 term, "unit of behavior," seemed too awkward. After extensive discussion, the term "process" was selected as the generic term to represent the basic components of the PM model, regardless of decomposition level. Therefore, the term "process" is used whenever the component being referred to could be an activity, function, sub-activity/function, process, sub-process, scenario, task, action, or step.

2.5.2.1.3 PM System Building Process

The PM prototype was developed using a collaborative, incremental, rapid prototyping approach to systems building. Development of PM was a team effort, with each team member having clearly defined roles and responsibilities. The project leaders served as primary researchers and requirements engineers. Other team members served as system architect, interface designer, and programmers. Critical PM requirements, priority, design, and development decisions were jointly discussed during weekly project team meetings. All team members participated in the discussion, although the individual responsible for a particular area had final decision authority. Increments were time-constrained to coincide with research contract deliverables. Understanding the strengths and weaknesses of the prototyping process used was critical to successful on-time delivery of the first version of PM to the research sponsors.

2.5.3 Development of a PM System Architecture

The PM prototype is based on a two-tier client-server architecture to support distributed collaborative computing. This architecture allows users to access PM through Java-enabled Web browsers regardless of their location, time or type of computer, connecting to a server capable of supporting multiple simultaneous users. PM consists of three main components: the server component, client component and a supporting administration module.

Server. The server component of PM is developed in Delphi and resides on a Windows NT server. It processes the requests from clients, stores or retrieves the data from the

back-end Paradox database based on those requests, and broadcasts update messages to each active client. There are two types of tables in the Paradox databases for the usage of PM: administration tables and process-related tables. Six administration tables keep information about sessions, users, privileges and login passwords, etc. The other six tables store all the data related to processes created in the sessions. In order to keep consistency and integrity of the database in a multi-user environment, the server implements required concurrency controls.

Client. The PM client component is initialized by a Java applet that is also stored on the NT server. The Java applet is downloaded through the Internet to the client computer whenever an authorized user logs in. A copy of the process model data is downloaded to the client machine when the user selects a specific process modeling session. The client component has a graphical user interface that allows users to perform a wide variety of tasks, such as viewing, adding, editing or deleting information about processes in the model. Whenever a user inputs a change, the process model data on the client machine is updated only after the corresponding data physically stored on the server has been changed. This design makes the system more efficient.

Although the client component can be used by any authorized user, facilitators have additional administrative options, including:

- Setting or modifying the session configuration by specifying what panels and prompts to display through the facilitator panel.
- Granting or modifying user privileges by defining whether users have the rights to view, add, modify, or delete various components of the model
- Viewing deleted processes and recovering them if necessary.

Administration Module. The administration module is a generic module supporting several different projects. For PM, it is primarily an administration utility used by system administrators and facilitators. Administrators are specially designated users who have all privileges including those required to create PM sessions, maintain user lists/passwords, and designate users as session facilitators. Facilitators have access to

their own sessions and can use the administration module to: create PM sessions, add/remove users to/from a session, add additional facilitators to a session, and perform general session file management and clean-up.

2.5.4 Analysis and Design of PM

PM analysis and design was a team effort consisting of the logical database and user interface design, discussed next. PM object classes are summarized later in this section.

2.5.4.1 Logical Database Design

The logical data model was developed by adapting the proposed contextual scenario data model based on the integrated scenario and process modeling concepts described in section 4.1.2 and adding the new data items that were identified during development of the integrated concept. The data model was then revised further to take advantage of the flexibility provided by the proposed user interface design. The primary entity in the model is the process. All other entities are either directly or indirectly related to process.

2.5.4.2 User Interface Design

The functional requirements provided by the project leaders were the primary input for the user interface design process. Different non-functional interface alternatives, each with different tradeoffs dealing with ease of use and data display, were mocked up using Microsoft Visual Basic. By presenting and discussing strengths and weaknesses of different approaches during the weekly team meetings, the best components of each design alternative were combined to create the final screens. Throughout the design process, all of the interface design considerations, alternative screen mockups, intended functionality, and system behaviors were stored in a web-based planning and design repository which served as the primary focus point for the weekly team meetings and allowed each of the team members to revisit the screen mockups outside of the regular meeting times.

The final interface design contained three primary components: a hierarchical tree structure for process decomposition (see left side of Figures 5 and 6), a tabbed panel text entry area to record details about each process in the tree (see right side of Figure 5), and a graphical area used for process depiction (see right side of Figure 6). The hierarchical

tree is a relatively simple tool, which supports the decomposition of processes into sub-processes and tasks.

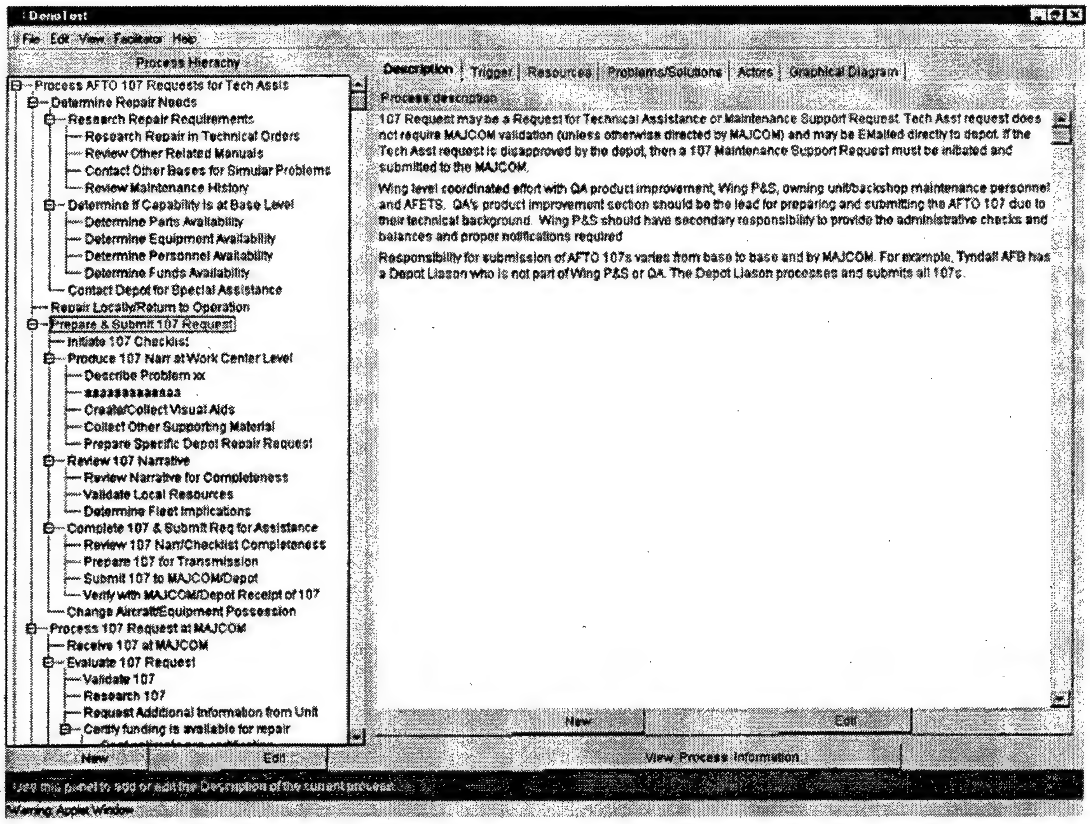

Figure 5. Process hierarchy and Information Panels

The text entry area was designed to capture different types of detailed information for each process in the tree structure. The two categories of data that can be captured for each process: (1) fixed-structure data (e.g., Overview, Metrics, Actors) and (2) generic, unstructured textual data (e.g., Description, Prerequisites, Results), each with its own layout and appearance in the tabbed panel display. The tabbed-panel approach provides a method for displaying and accessing a great deal of information while simultaneously conserving screen space. The fixed-structure panel format cannot be changed, and contains fields, which are geared to recording specific data about each process (e.g., cost, frequency, viewpoint, and equipment requirements). The generic panels provide the flexibility to customize PM to suit specific process modeling needs in a wide variety of organizations. Each panel contains a single large text box that allows the users to

describe a certain aspect of the current process (e.g., Prerequisites, Results). Each individual item input by a user creates a new entry in the respective panel.

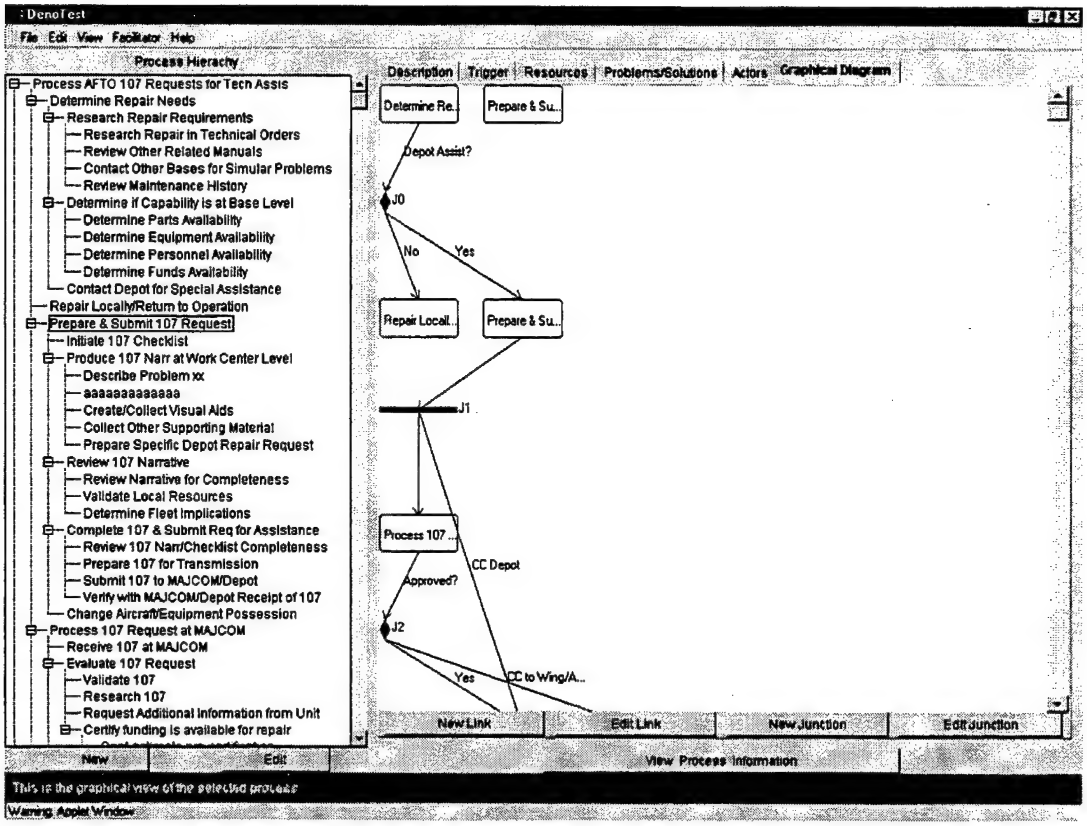

Figure 6. Graphical View of a Process

A session facilitator has the ability to focus the attention of the users to specific aspects of the process being modeled by making specific tabbed panels visible or not. For example, if all panels but the Description panel are hidden from view, the users can focus their attention on describing each process in the tree. Once group consensus has been achieved on the process description, other aspects of the process may then be modeled by making the appropriate panels visible. Additionally, if there is some dimension of the process for which a generic text panel does not exist (e.g., security issues), the facilitator can either rename an existing generic panel, or create a brand new generic panel to fill that need.

The final interface component involves the graphical diagram capability. This functionality is placed on the last of the tabbed panels, and is labeled "Graphical Diagram." The graphical diagram allows more details to be added to the hierarchical process decomposition contained in the tree structure such as process sequence, decision logic, and conditional flow.

2.5.5 Building the PM Prototype

2.5.5.1 Development Environment

Java was selected as the programming language for the client component of PM for a number of reasons. Java is object-oriented, and has extensive built-in networking capabilities that allow for development of distributed applications. Java is also portable and architecturally neutral. This means it can be executed in any environment that supports Java applets, such as Windows NT, Windows 95/98, Unix or Macintosh.

2.5.5.2 PM Object Model

The client component of PM consists of five different types of objects:

- Process Model objects (e.g., Process, Actor, Object, Link)
- GUI objects for regular users (e.g., TreePanel, OverViewPanel, ActorPanel, ObjectPanel, GraphPanel)
- Additional GUI objects for facilitators (e.g., FacilitatorFrame, UserPrivPanel)
- Communication objects (e.g., Client, ClientEvent, ClientAdapter, ClientListener)
- Administration objects (e.g., AdminFrame, UserList, SessionList)

All the activities related to process are actually performed by the ProcModel object. Other objects are used for GUI, communication, or administrative control purposes.

2.5.5.3 Implementation

When a session is generated using administration module, a sub-directory for that session is automatically created on the server. The six process-related tables are created and stored in that sub-directory. Then, a user can download the client Java applet through the Internet and log into that session. A protocol based on Java Socket was designed and implemented for communication between the client and the server. Before sending

update requests to the server, the client has to request locks on all related data items from the server (row-level locking). If the locking requests are approved, the clients will send an SQL-embedded request to the server. The server is responsible for verifying the user privileges and parsing the incoming request. If the user has the right to update the data and the request is correctly parsed, the appropriate data items in the Paradox database are modified and locks held by clients are released. Finally, the server broadcasts the change to all active clients. Each client will update their local copy of data and refresh the process model on the fly. PM can also export a report of the generated process model in HTML format by using Delphi Dynamic Link Library (DLL) calls.

In order to facilitate the communication among collaborative users, we also implemented a tool called 'chat window', which can be activated from the menu bar. It will pop up a small dialog window and the text that is typed by one user can be echoed to others. All the contents in the chat window will be stored in a table on the server. This tool was used in the field study and proved helpful in the distributed collaborative environment.

2.5.6 Observing and Evaluating PM

The final stage in the PM systems development research was to observe and evaluate the system to determine compliance with the stated requirements, assess its impact on users and groups, and identify desired improvements. Results of this evaluation were highly encouraging. Users consistently rated PM over 4 (of 5) on ease of use.

2.6 Requirements for DII COE Level 5

The two primary tools in the DOME system are GroupSystems and Process Modeler. Since GroupSystems is a commercial tool and Process Modeler is a research prototype developed in a very short time frame with limited resources, investigating Defense Information Infrastructure (DII) Common Operating Environment (COE) requirements was secondary to achieving primary DOME project goals within contract costs. In general, the DOME environment was developed with DII COE Level 3 (as seen in Table 2) as the goal runtime compliance level. The goal was to ensure that environmental conflicts were resolved so that DOME components could co-exist on the same workstation/LAN as COE-based software. The degree of GroupSystems and Process

Modeler runtime compliance and actions required to reach Level 5 are briefly summarized below.

Runtime Compliance Level	GroupSystems	Process Modeler
Level 1 – Standards Compliance • Standards compliance • Undisciplined data sharing • Software reuse	 • Partial (Kernel only) • Minimal • Partial (other GS tools)	 • Partial (Kernel only) • Virtually none • Partial (other Java tools)
Level 2 – Network Compliance • Co-exist on same LAN/different CPU • Limited data sharing • Common appearance	 • Yes • Minimal (via text/RTF) • Yes	 • Yes • No • Yes
Level 3 – Workstation Compliance • Co-exist on same LAN/workstation • Data sharing via common standards • Kernel COE resident on w/s • Use COE components	 • Yes • Generally no • Yes • No	 • Yes • No • Yes • No
Level 4 – Bootstrap Compliance • In segment format • Use bootstrap COE • Separate application login account	 • No • Yes • Yes	 • No • Yes • Yes
Level 5 – Minimal Compliance • Share same kernel COE • Available via Executive Manager • Have segment descriptor files • Adhere to Windows "look & feel" • Segments registered, in on-line library • Use COE installation tools	 • Yes • Yes • No • Yes • No • No	 • Yes • Yes • No • Yes • No • No

Table 2. Process Modeler and Group Systems Compliance Levels

GroupSystems is a commercial product that was not developed for the Department of Defense. Therefore, while GroupSystems successfully runs without conflict on the same workstation/LAN as COE-based software in the DII COE, it does not fully comply with any of the runtime compliance levels. It does operate in a Windows NT 4.0 environment (DII COE Kernel), but does not use some of the other standard non-kernel components (e.g., MS Access's data access services). However, it comes with a built-in database as part of its installation package. It is available via standard Windows run options (e.g.,

Start Menu, Desktop Icon, Run command) and also conforms to the basic "look and feel" of the Windows graphical user interface. However, segmenting has not been performed nor segment descriptions developed IAW DII COE standards. Nor does it use COE components or services. Although GroupSystems does not interfere with standard Windows/LAN login security, a separate GroupSystems login account must be established in its administrator module and used to login to GroupSystems sessions. Data sharing is primarily between GroupSystems tools, although some limited data sharing with other applications is possible using text or RTF files.

Modification of GroupSystems to comply with DII COE Level 5 requirements would have to be coordinated with the vendor, Ventana Corporation. Ventana does regularly upgrade GroupSystems, keeping pace with the most current Windows operating systems and using Windows development standards as guidelines. Therefore, as DII COE requirements move more closely towards Windows standards, GroupSystems will more closely comply with the DII COE standards. However, in all likelihood, Ventana would only implement DOD-unique requirements if they were directly paid to do so.

The Process Modeler client runs without conflict on the same workstation/LAN as COE-based software, but primarily uses Microsoft's Internet Explorer 4.01 to run the Java applet from the server. This is because Netscape (the DII COE standard browser) did not provide the required level of Java support until very recently. Although new versions of Netscape (4.5 and greater) will most likely run the applet, some additional testing and software modifications may be required to ensure capability. The Process Modeler server operates under Windows NT and can operate any web server. Therefore, its web resource needs should always be in line with COE-based software. However, the server uses Borland's Database Engine (BDE) for data storage and access. The server comes packaged with the BDE, and the BDE is automatically installed. No additional support or purchasing is necessary. The client and server have not been segmented nor segment descriptions developed IAW DII COE standards. COE components and services are not used. Like GroupSystems, Process Modeler has its own login accounts. There is virtually no data sharing except for that provided by the HTML report capability.

All modifications to Process Modeler, both to improve functionality and to comply with DII COE Level 5 requirements, are contingent on funding availability. Full level 5 compliance may require a complete rewrite of the Process Modeler server module, so it is probably not cost effective. In contrast, improved data sharing, especially for GroupSystems import/export, is essential to provide adequate meeting support. The client applet is by definition tied to Java applet standards and is limited to as much compliance to COE-standards as the Java platform is.

3.0 DOME DEMONSTRATIONS

3.1 Strategic Planning Support

Strategic planning is an essential part of establishing the Air Force's direction. Using a distributed group support system for strategic planning was one avenue to make effective use of technology and improve the strategic planning process. In the United States Air Force, quality is a combination of leadership commitment and operating style that inspires trust, teamwork and continuous improvement. According to Dettmer (3) quality has become a necessary condition, not a discriminator. At an Air Force Wing, quality is a thinking process which enables the entire unit to understand the effect of local actions and decisions on the overall mission performance.

Strategic planning is a process by which the entire organization envisions the future and develops a plan to weave quality into that future. One method for an Air Force Wing to accomplish quality in a strategic planning process is to include a large number of the units in the development of the plan. Unfortunately, practical constraints such as time or scheduling typically limit the number of people who can be involved in a group process. If there are 20 members of a squadron leadership team that plan to work on developing action plans for 15 or more measurable objectives in an eight-hour period, the team shares 480 minutes. That leaves 32 minutes for each target and 1.6 minutes of talk time for each person in the group. These calculations are made without considering lunch or breaks so the 1.6 minutes will actually be less than a minute. If a facilitator controlled the interaction so each person in the group had less than 1.6 minutes to discuss an action plan, the participants would not have contributed much to the discussion or the decision. Thus, there would be difficulty inspiring trust and enabling the unit to understand the effects of local actions on the overall mission.

Too often, strategic planning is treated as an annual paperwork exercise that has limited effect on the way organizations actually do business. Also the strategic planning process can frustrate the individuals who devote so much time to creating a product that usually only sits on a shelf. Few have promised that strategic planning would be easy, nor is

there a guarantee of success. The Air Force has to be able to adapt to change more quickly than at any other time in history. But the Air Force must do more than just adapt to change. It must proceed proactively to decide what the future will be and shape it.

The articulation of an Air Force Wing's strategic plan is a mechanism for communication that promotes the coordination of activities and goals across the organization. In an attempt to simplify the strategic planning process, many units in the Air Force have adopted a hybrid of some of the more popular models. The culmination of models and methods has produced a model that the 366th Wing at Mountain Home AFB used to develop strategic plans. Working directly with General Peck and Lieutenant Colonel Shearer a strategic planning methodology was developed. The unit needed to establish a vision for the future, institute a mission statement, develop goals based on the mission, create objectives to meet the goals, establish targets, and write action plans to guide the unit in accomplishing the mission and goals of the organization. Target is a term specific to the Air Force's planning approach and used at the 366th to describe specific sub-objectives. The targets are a necessary step at he squadron level since goals and objectives are defined at the wing level and are not required to have metrics. Subordinate units at the Group level specify sub-objectives (targets) and squadrons develop action plans to meet the Wing goals and objectives. When a subordinate unit meets the metric of a target the Air Force Wing's strategic plan is a step closer to completion.

Electronic meetings have helped the Air Force adapt to change quickly by making group processes efficient. Air Force strategic planning teams have met and engaged in planning processes that effectively coordinate time and resources to produce an optimal solution. A group support system (GSS) used in conjunction with facilitation expertise has demonstrated positive outcomes. The following at a few points from the participants in the research:

- "Use of Intranet made it easy to allocate time to provide input (easy to "park" while handling other pressing issues, and then come back to later." *Time Management: Seamless start and stop interaction*

- *"Very useful tool for "jotting down ideas" for future use. Allowed for others to view other ideas and spin off if applicable. Use of modern technology [GroupSystems] quickened the process and also produces useful reports to work from." *<u>Time Independent Idea Development</u>: GroupSystems was used to record ideas as the came up in the course of a workday.*
- "I think it went really well [the strategic planning session]; however, with utilizing the distributed software prior to today, time spent here could have been better utilized." *<u>Participation</u>: All group members did not interact in the distributed sessions so there was frustration when we took f-t-f time to do activities which should have been done distributed*
- "Very difficult to gain access from my office." *<u>Procrastination:</u> Some participants waited until the day before the f-t-f meeting to gain access to the session*
- "Having access to the system ahead of the scheduled strat planning session is helpful." *<u>Pre-work:</u> Generating potential actions prior to the strategic planning session was useful for the group*

GSSs allowed large numbers of participants to interact as teams across all levels of an Air Force Wing. The Air Force Wing's squadrons are directly linked to the Wing Command, Wing Groups and Wing Staff through the computer's repository. When the group interaction is anonymous, the Airman has a voice as loud as the most senior officer does. The GSS methodology developed and described previously allows the Air Force to produce quality strategic plans with effective use of resources.

A computer-mediated strategic planning process helps reduce the constraints associated with bringing a large group of people together to collaborate. Group support systems (GSS) are technology designed to directly impact and change the behavior of groups to improve group effectiveness, efficiency and satisfaction (Nunamaker, Dennis, Valacich, Vogel, & George, (6)). GSSs have been designed to reduce the effects of the barriers to ideal group decision making (Adkins, 1994). According to Valacich, Dennis, and Nunamaker (9), "a group support system (GSS), is described as an environment that

contains a series of networked computer workstations that enable groups to meet face-to-face, with a computer-supported electronic communication channel used to support or replace verbal communication" (p. 49-50). When a GSS is applied to group decision making: (1) ideas can be exchanged between group members and organized into distinct categories, (2) the categories can be analyzed by group members exchanging information through electronic file folders, (3) consensus can be developed between group members, (4) data can be used and reviewed in future meetings, and (5) data can be exported to a superior or expert for critique or approval.

GroupSystems software, developed at the University of Arizona, supports several different group tasks. The standard GSS decision sequence is a five-stage process. First, a group leader meets with a facilitator to set an agenda for the meeting and decide which GroupSystems tools to use. Second, meetings usually begin with group members generating, exchanging, and evaluating ideas. Third, the ideas are organized into a manageable framework of distinct categories. Fourth, group members critique the categories. The emphasis in this stage is to understand the category and develop plans for how to activate the category. Fifth, group members attempt consensus building.

A meeting facilitator has multiple roles during a meeting (Brashers, Adkins, & Meyers, (2), Nunamaker, et al., (6)). For example, the facilitator may be the group leader, a group member, or an individual that is separate from the group and neutral by decree. In most of the meetings that use GSS at the University of Arizona the facilitator is not a member of the group. Meeting participants and organizational members can also facilitate GSS sessions. The role of the facilitator is to provide technical support, plan an agenda, maintain an agenda, and set ongoing standards for how the GSS is used in an organization (Nunamaker et al., (6)). If an organization does not have a trained facilitator, the ActionPlanner and SenseMaker templates can be used to help organize and run a GSS session.

Typically the facilitator's first encounter with the group is with the group's leader before the group meets. The facilitator and the group leader meet prior to the actual meeting to

discuss the purpose of the meeting and make a plan to blend the GSS' tools with the intended goals for the meeting. A product from this meeting is a detailed script that outlines the structure of the group's meeting. The script indicates the specific phrasing of the questions or topics that will be addressed during the meeting, the group support system software tools that will be used and the length of time each tool is to be used by the group. After the preplan meeting the facilitator mediates between the structure of the preplan script and the actual group interaction by setting up the GSS' software tools and monitoring the group's process during the group's meeting.

When the group meets at the group support system facility the facilitator introduces the group to the tools and explains how the interaction is going to proceed. After introducing the tools, the facilitator explains the question or topic that is going to be addressed and discusses the structure of the meeting with the group. For example, the facilitator may tell the group that the EBS tool will be used to analyze the criteria against which Wing goals will be rank ordered. The technical role of the facilitator is to set up the software with the specific criteria and tell the group how EBS works. That is, tell the group that all the ideas are submitted anonymously (if that option is going to be used). Explain how EBS randomly passes each individual's ideas around to different group members, how a group member can comment on another group member's idea and then pass the original idea with comment on to another group member.

As a process monitor the facilitator keeps track of how long the group has been using a tool, suggests ways to increase productivity when using the tool, and tells the group when to move on to another tool. The role of the facilitator is multifaceted. On one hand, a facilitator needs to have the technical knowledge and skill to use the tools provided in a GSS. On the other hand, a facilitator needs to be able to communicate with the group's leader to develop an agenda that meets the group's goals and to perform the agenda at the meeting. In an ideal situation determining the goal of the meeting and designing the process that the group should go though to achieve the desired outcome should be simple, but in actuality it is a complex communication task.

A case study was conducted at the 366th Wing on computer-supported strategic planning. A facilitation methodology for Air Force strategic planning was established using senior leadership at the 366th Wing. The outline of the methodology is to first, work a two-day off site meeting with senior leadership in a small group of eight to establish the mission, vision, goals, and broad objectives of the Wing. Second, work a one day meeting at the group level to establish strategic targets based on the Wing's objectives. Third, work one-day meetings at the squadron level to develop measurable action plans based on the Group's targets.

At the 366th Wing there is a Wing Command and 5 group level units, Wing Staff (WG), Operations Group (OG), Logistics Group (LG), Support Group (SPTG), and Medical Group (MDG). Each group is responsible for a number of squadrons and there are 24 squadrons in the 366th Wing. CMI worked with the 366th Wing command, three groups (OG, LG, and SPTG), the 366th Wing staff, and seven squadrons using computer-supported strategic planning methods and a group support system (GSS). The specific GSS method is explained in detail in the following paragraphs. After the strategic plan was developed, seven external Quality Improvement officers evaluated 24 squadron level strategic plans. Quality questionnaires were administered to all squadrons (alpha=.93). Open-ended data were collected from squadrons using both traditional and computer-supported strategic planning methods. All squadron action plans were evaluated by a panel of seven experts using a quality scale (alpha = .94).

The computer supported strategic planning accomplished by the 366th Wing included three major areas: 1) Wing level strategic planning, 2) Group level strategic planning, and 3) Squadron level action planning. At the Wing level, members of the Wing Command met off site and used a deployable LAN consisting of networked laptop computers running Novel NetWare and GroupSystems. The process to conduct the computer-supported strategic planning session included: the discussion of the function of mission and vision statements on-line; review of 1996 mission and vision statements in parallel with the other participants; group authoring of new mission and vision statements; the use

of a nominal group technique and anonymous voting to select the final statements for the Wing.

The Wing Command then brainstormed ideas for Wing goals using the previously developed mission and vision statements as a guide. Anonymous voting on the goals and refinement of the highest rated goals resulted in a final list of goals, which were used as a basis for the development of Wing objectives (Figure 7).

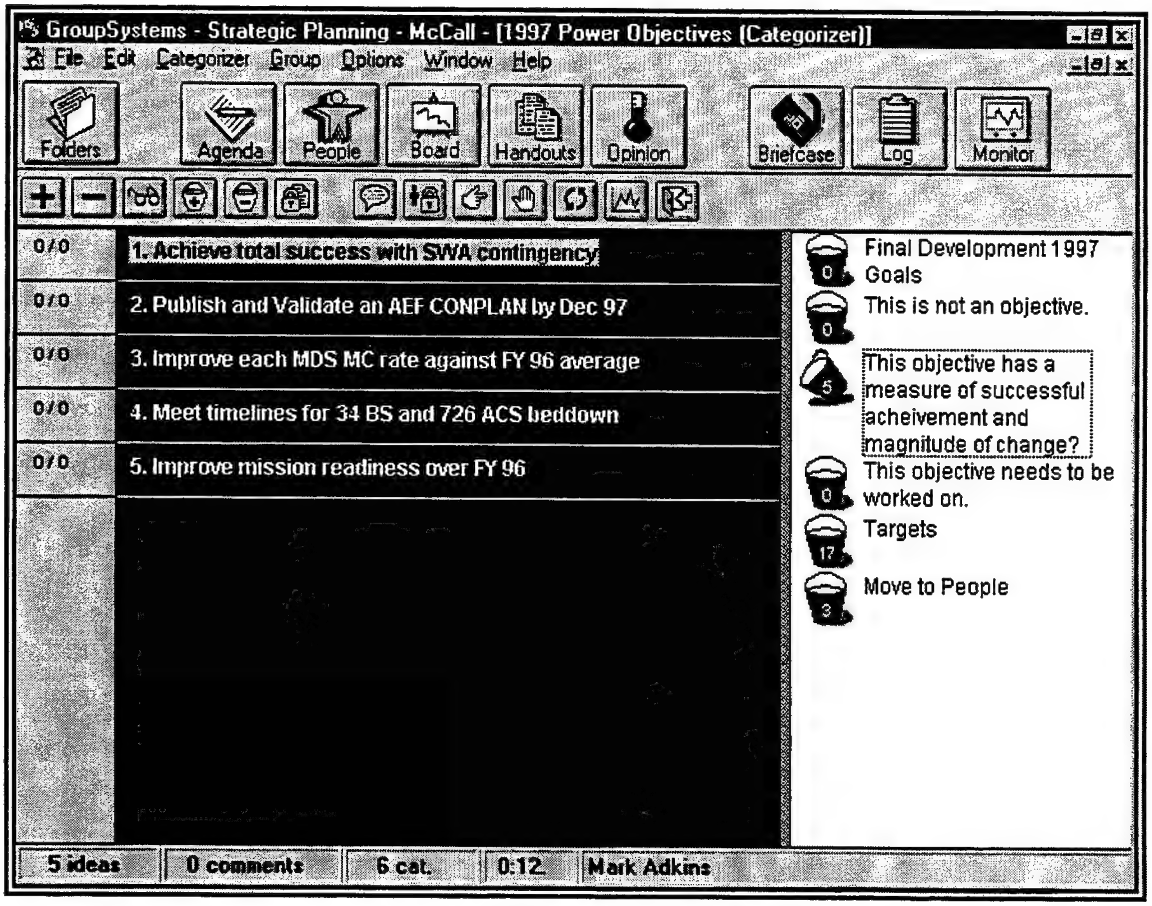

Figure 7. Using Categorizer and Criteria to Develop Objectives

The Wing goals were placed in a hierarchical tree structure so those objectives that supported each goal could be generated in parallel. The objectives were reviewed against three criteria that had been developed previously: 1) This is not an objective, but is a candidate for Group level review, 2) This is an objective that requires additional work, or

3) This is an objective as written. The GroupSystems Categorizer was used to accomplish this task.

The Group Level strategic planning was accomplished in similar fashion. A tree structure of Wing goals and objectives was presented to the Group staff members for each of the Groups. Each Group staff developed targets in parallel and reviewed them against three criteria: 1) This is not a Group level target, 2) This is a Group level target that requires work, or 3) This is a Group level target as written. The targets were refined as needed and the group then moved on to the next objective. Once again, the Vote and Categorizer tools were used to accomplish these tasks.

CMI has created and fielded a set of robust collaborative application prototypes to enhance the performance of teams thinking towards a decision or common goal. The result of the work that has been on-going for two decades is now embodied in GroupSystems, a suite of collaborative software tools market. Those tools are described below:

> The Standard Tools [of GroupSystems] support business needs such as strategic planning, activity based costing, business-process reengineering, innovative problem solving, product definition, knowledge management, and many more. To support these needs, the Standard Tools use group processes such as brainstorming, list building, information gathering, voting, organizing, prioritizing, and consensus building.
>
> **<u>Categorizer</u>** helps your group generate a list of ideas and supporting comments. You then create categories for the ideas and easily sort the ideas and comments into the desired categories.
>
> **<u>Electronic Brainstorming</u>** provides a simple process in which a question or issue is distributed to participants, who respond with comments. It promotes creative and far-reaching discussions.

Group Outliner allows the group to create and comment on a multi-level list of topics. Structure lines, bullets, or a legal numbering format represents levels of subordination.

Topic Commenter offers participants the opportunity to comment on a list of topics. This tool's format for idea generation is more structured than Electronic Brainstorming, but less structured than Group Outliner.

Vote provides a variety of methods which help the group evaluate a list of ideas to develop consensus or reach a decision. The results can be displayed in statistical and graphic formats.

You can also customize your GroupSystems installation with the add-in tools that you need. The following add-ins can be purchased with the GroupSystems Standard Tools or as standalone applications.

Survey expands the horizons of on-line surveys. Use Survey for face-to-face or distributed groups across local area networks, e-mail, the Internet, or your company's intranet — and then collect and analyze results with push-button ease.

Alternative Analysis allows your group to explore the strengths and weaknesses of strategic plans, select candidates, determine the impact of a plan on stakeholders, generate and prioritize product requirements — and much, much more.

Activity Modeler, the first team-based modeling tool, allows a team to work directly and simultaneously on a graphical model of business

> processes — so you can quickly and easily redesign the way your business operates.[1]

GroupSystems software is used in a GSS and was developed at the University of Arizona. GroupSystems software supports several different group tasks. This paper will focus on the support tools that are directly related to the process of computer-supported strategic planning. According to Nunamaker, Dennis, Valacich, Vogel, and George (1991) there is a common sequence of GSS use that is coupled with specific software tools. The standard GSS decision sequence is a five-stage process. First, a group leader meets with a facilitator to set an agenda for the meeting and decide what GroupSystems tools to use. Second, meetings usually begin with group members generating, exchanging, and evaluating ideas. Third, the ideas are organized into a manageable framework of distinct categories. Fourth, group members critique the categories. The emphasis in this stage is to understand the category and develop plans for how to activate the category. Fifth, group members attempt consensus building.

Typically, groups use an electronic brainstorming (EBS) tool to generate ideas. The tool is designed for group members to type in comments on a specific question shown on their screens. Once a group member enters in a comment the idea is randomly passed on to another group member. In addition, a list of all the ideas can be shown on the large screen in the front of the room and at each individual workstation. This tool is designed to allow group members to build on others' ideas without evaluation. Also, the tool can make all the comments submitted to the group anonymous.

In addition to EBS, there are two other tools that can be used for idea generation and evaluation. The first tool is topic commenter (TC). This tool functions like a set of index cards with topics written across the top of each card. A participant selects a specific topic card, enters comments and reads the comments submitted by other group members. The second tool, group outliner (GO) is very similar to TC but GO allows the group members

[1] Website of Ventana Corporation, a technology transfer company of the CMI: www.ventana.com

to develop multiple sets of index cards in an indented outline structure. Usually, but not always, TC or GO are used after EBS as an organizational tool.

The idea generation tools, EBS, TC, and GO, are engineered to reduce the traditional constraints of a face-to-face meeting such as status pressure and turn taking obstacles. GSS provides a bridge over status and turn taking barriers so groups can develop exhaustive lists of ideas and solutions that solve problems and answer the group's questions.

Additional idea organization can be done with the categorizer tool. This tool provides a two- phase approach to idea organization. First, the tool allows group members to develop and analyze a list of categories and supporting ideas for each category in a number of different windows. New ideas can be generated with this tool and ideas from the EBS session can be incorporated into different categories. Second, the categories and the various supporting ideas in each category are consolidated. The consolidation process involves verbal interaction between the facilitator and the group members. The categories are usually analyzed for redundancy and combined into new or existing categories without deleting ideas.

After the categories have been created and analyzed the group attempts to build a consensus by using prioritizing tools. There are a variety of methods available to rank categories (e.g., yes/no, multiple choice, and rank order). Alternative analysis enables the group to rate the alternatives in a multi-dimensional matrix then presents the results to the group on their individual screen and on the large projection screens in front of the room. Group survey allows each group member to fill out an electronic questionnaire. The questionnaire is usually pre-constructed and designed to assess either a specific characteristic of the group (e.g., cohesiveness, level of group trust) or information about the available alternatives (e.g., are you satisfied with the alternatives). A group facilitator operates most of the GroupSystems tools and GSS technology.

The Squadron Level action planning for each of the seven squadrons utilizing the GSS followed a methodology. The methodology included a review of the action plan definition, review of the function of an action plan, discussion of the action plan template, review of the Wing and Group goals, objectives, and targets, development of potential action plans in parallel, and finally comparison of action plans to criteria.

Action plans were defined as a link between day-to-day work place activities and the vision, mission, goals, and objectives of the Wing. Action plans should meet the needs of the squadron while being simple and easy to apply. They also had to be directed at processes that could be measured, analyzed, and improved. The design of the action plans was such that they were implementable, acceptable, and attainable. The action plan template used included a description, metric, milestone, success criteria, responsible authority, resource identification, and feedback mechanism.

<u>Participants</u>

There were 226 participants from the 366th Wing. At the squadron level there were 139 participants (Males=105, Females=21, n/a=13). The mean age of the squadron participants is <u>M</u>=35.4 and a range of 21 to 56 year of age. The majority of the squadron participants had participated in one or less computer supported meetings (N=107). Representatives from 22 of 24 squadrons participated in the research project. Seven squadrons (N=92) used computer- supported strategic planning methods and 17 squadrons (N=47) used traditional strategic planning methods. There was a panel of seven external Quality Improvement officers used to review the squadron's action plans. The reviewers have a mean of <u>M</u>=20.1 years of service in the Air Force and a mean of <u>M</u>=2.96 years working on strategic planning.

<u>Dependent Variables</u>

A six item quality questionnaire (alpha=.94) was created for the reviewers to evaluate the action plans each squadron developed. The reviewers' questionnaire measured the quality of the action plans, achievability, buy-in, how well the action plans addressed the targets, and how clear the plans are measured. The 26 item satisfaction questionnaire

(alpha=.93) measured satisfaction with the strategic planning process and commitment to the strategic plans produced. Time to completion was measured via a questionnaire and actual measurement.

Results

The squadrons, which used group support systems (GSS) to develop strategic plans, developed higher quality strategic plans than those squadrons that did not use GSS ($t(7)=3.47$, $p<.05$). There was no significant difference for commitment to implementation between the GSS and the non-GSS squadrons. Squadrons that used computer-supported strategic planning where more satisfied with the strategic planning process than those squadrons that used traditional strategic planning ($t(137)=-2.28$, $p<.05$). The strategic planning process took an average of 17.7 hours for squadrons that did not use GSS and less than 8 hours for those squadrons that used GSS.

The external evaluation of the quality of the squadrons' strategic plans provides a strong indication that strategic plans created with computer-support are higher in quality than those strategic plans produced without the use of GSS. In addition to high quality, the computer-supported strategic plans addressed the Group's targets well and provided an action plan that had a specific measurable. Squadrons that used the computer-supported strategic planning methodology saw an increase in satisfaction with the overall strategic planning process. Also, there was a significant increase in the number of ideas generated and incorporated into the process as compared to traditional face-to-face strategic planning. The increase in satisfaction with the process should lead to higher quality strategic plans and greater more detailed participation in the planning process.

Less time was used to develop action plans when the computer-supported strategic planning methodology was used. The non-GSS squadrons used perceptual data and the GSS groups' used actual data regarding time to completion. These data are fair to compare as several GSS users commented, in open-ended questionnaires, on how fast the strategic planning went when they used GSS. In the past, GSS have been shown to take advantage of parallel processing and decrease the time to completion so it seems

reasonable that the same results are found in this case study. There was not a significant difference between GSS and Non-GSS groups regarding commitment to implementation. When a participant is asked, "I am compelled to implement the action plan," the squadron members' Air Force training should dominate the group's thinking and the squadron should be committed to the strategic plan regardless of how the plan was developed.

Overall the study provides support for the claim that computer-supported strategic planning can assist the United States Air Force in planning for the future. Computer-supported strategic planning allowed a Wing of several thousand people to meet and develop a holistic strategic plan in less than three months. Computer-supported strategic planning allowed each level of the wing to build on previous level's ideas and comments. GSS allowed hundreds of people to be directly involved the strategic planning process. Involving large numbers of personnel in the planning process helps produce a high quality product that could not be developed practically using traditional face-to-face methodology. Computer-supported strategic planning assisted the United States Air Force in developing higher quality strategic plans in less time than traditional strategic planning methods.

Future Directions

The computer-supported strategic planning methodology needs to be tested using multiple facilitators at a number of different United States Air Force Bases. The additional testing will provide generalizabilty for the computer-supported strategic planning methodology. In addition, researchers should work with Wing staffs and Groups to improve on the strategic planning process developed in this study. Investigators should focus on the link between objectives to targets and action plans. The link between these items is critical to developing a Wing wide strategic plan.

3.2 AFTO 107 Process Improvement

The purpose of the DOME Technology Demonstration was to showcase how the DOME prototype system could be successfully used to improve an existing Air Force process. The process selected for the technology demonstration was the AFTO 107 Request for

Technical Assistance process used by Air Force units to request depot-level repair assistance. The key participants in the demonstration were the 366th Wing at Mountain Home and Warner-Robins Air Logistics Center AFTO 107 managers and engineers involved in repair of the F-15 aircraft. Representatives of two Air Force major commands (MAJCOMs) and several other F-15 units also participated during the demonstration and background interviews. The demonstration was conducted over a series of three face-to-face and distributed meetings to explore the strengths and weaknesses of the DOME prototype system in each of these environments.

A detailed description of the technology demonstration is provided in the following sections. The first section briefly describes the meetings and interviews held throughout the DOME project to gather preliminary information about the AFTO 107 process. Each of the technology demonstration meetings is then discussed individually. The costs and benefits of the proposed DOME methodology are then presented, followed by a summary of the results of the technology demonstration. The process descriptions and models are included in the appendices: the "as-is" model is in Appendix A, and the "to-be" model is in Appendix B.

3.2.1 Background

During the initial phase of the DOME project, GroupSystems meeting rooms were installed at Mountain Home and Robins Air Force Bases. These GroupSystems capabilities were used during face-to-face meetings to gather the initial information about the AFTO 107 Request for Technical Assistance process. At Mountain Home, CMI researchers facilitated a group of wing and logistics support personnel in the development of a detailed activity model of the wing AFTO 107 process. Similarly, CMI researchers worked with AFTO 107 managers and engineers at Warner Robins Air Logistics Center to develop an activity model of the depot AFTO 107 process. GroupSystems Activity Modeler was used to support collaborative model development during both these meetings. Interviews were also conducted with AFTO 107 personnel at the Air Combat Command to develop an informal model of the MAJCOM process and at Seymour-Johnson and Tyndall Air Force Bases to identify local differences in the wing AFTO 107

processes. In preparation for the technology demonstration, CMI researchers consolidated these models into a strawman AFTO 107 process model that became the starting point for the technology demonstration.

3.2.2 Phase 1: Same Time, Same Place Meeting

The first phase of the DOME Technology Demonstration was a same time same place meeting held at the University of Arizona in Tucson, Arizona, on 19 – 21 October 1998. This meeting is described in detail by first providing an overview of the specific meeting task, group participants, meeting context, and technology, followed by a more detailed discussion of the meeting process and outcome.

Task

The primary task was to validate and refine the strawman AFTO 107 process model so that it accurately represented the process from the depot, MAJCOM, and wing viewpoints. To accomplish this task, participants defined/validated each required action, provided a short name and a complete description for those actions, determined the event that triggered each action to start, identified who was responsible for performing the action, and highlighted critical resources required to complete the action. After completing the process model, participants briefly identified problems with the AFTO 107 process to begin the process improvement task planned as the focus of the next meeting.

Group

Six Air Force personnel actively participated in the meeting. A seventh Air Force attendee observed the meeting as a representative of the Air Force's DOME contracting office. Air Force meeting participants included a logistician and engineer from Mountain Home AFB, the F-15 AFTO 107 manager and a reengineering specialist from Warner-Robins Air Logistics Center, and F-15 maintenance managers from two Air Force MAJCOMs (ACC and AETC). Participants were military and civilian employees with over 20 years experience, including an average of over 12 years with the AFTO 107 process. Most participants had limited familiarity with the DOME project, with only one participating in the earlier meetings. While all participants used computers at least

several times a day and had good experience with an Internet browser, they reported limited to no GroupSystems or modeling experience.

Three CMI researchers facilitated and observed the meeting. Two of these researchers had participated in at least some of the earlier information gathering meetings so they were familiar with the basics of the AFTO 107 process.

Context

This initial meeting of the technology demonstration was conducted as a face-to-face meeting using a large permanent GroupSystems meeting facility at the University of Arizona. The CMI technical staff provided the support required to ensure that the hardware, software, and communication network operated smoothly throughout the meeting. All systems were fully tested and problems resolved well before meeting participants arrived.

All Air Force participants traveled from their home bases in Idaho, Georgia, Virginia, Texas, and Ohio to attend the meeting.

Technology

The facilitators and all meeting participants used personal computers connected to a local area network (LAN), and through the LAN, to the Internet. Three public screens were connected to the facilitators' workstations and other display equipment. The primary software used during the meeting was the new Process Modeler prototype developed under the DOME contract. Process Modeler is designed as a client-server application for use in face-to-face and distributed environments. The Process Modeler server is located at the University of Arizona and communicates with both local and remote clients via the Internet. Users downloaded the Process Modeler client software and a copy of the AFTO 107 process model using Microsoft's Internet browser, Internet Explorer, version 4.01. As described in the following section, GroupSystems was also used at the beginning and end of the meeting. Each participant's GroupSystems workstation was directly connect via the LAN to the meeting room's local GroupSystems server.

Process

The meeting began with the Air Force project manager and CMI researchers providing a brief overview of the DOME project and the goals of the DOME technology demonstration. CMI researchers then presented the specific goals for this meeting and general meeting guidelines, and had all meeting participants introduce themselves to the group. After the introductions, CMI researchers requested that participants sign-in using GroupSystems Topic Commenter. The purpose of this exercise was twofold: (1) to develop an accurate participant roster, and (2) to introduce GroupSystems to the participants.

The Process Modeler prototype was introduced next using a simple model that described the steps required to prepare and go on Temporary Duty ("Go TDY"). CMI researchers provided brief instructions on the three main components of the Process Modeler:

1. Process Hierarchy – A hierarchical (tree) view shows how a process is decomposed into sub-processes and then further into individual actions required to accomplish each process/sub-process. Each node in the process hierarchy is given a short action name of the form "verb + object," e.g., "Request Travel Orders." Note: Each node in the process hierarchy, regardless of whether it represents a process, sub-process, or action, is generically referred to as a process.
2. Process Information Panels – A series of panels, each panel capturing a different type of information about a process, e.g., its description, resource requirements, triggering event, or actor responsible for accomplishing the action. A set of panels is associated with each process (node) in the process hierarchy. Panels are displayed for the process currently highlighted in the hierarchical (tree) view.
3. Graphical Process Model – A graphical view of the process model showing sequence and flow of the actions. Each process node in the hierarchical (tree) view is automatically shown on the diagram using graphical conventions for the Unified Modeling Language's Activity Diagram. Participants may then link these nodes together to reflect action sequence and decision flow. The Process Modeler automatically redraws the diagram to reflect the action sequence identified by the participants.

Instructions were also provided on how to add/modify nodes in the process hierarchy and add/modify textual information to the process information panels. Participants practiced these actions by modifying the sample "Go TDY" process model to more accurately reflect their actual (or desired) TDY process.

CMI researchers then used the Process Modeler and led the group through a high-level review of the strawman integrated AFTO 107 process model. As described in the background section, this model was consolidated from the individual wing, depot, and MAJCOM activity models developed during earlier meetings and interviews. All participants could view the AFTO 107 process modeler on their individual workstations and on the public screen.

Participants then worked individually (or in pairs with the other representative from their organization) to refine the process model by adding new processes left out of the original model, modifying process names to improve clarity, and adding process descriptions whenever they were missing. The role names of individuals responsible for each process were also identified. Although all participants reviewed the entire model, participants primarily focused on improving their portion of the model (e.g., depot personnel worked on depot processes). CMI researchers assisted participants whenever they had problems with the Process Modeler, but most participants seemed to find the tool easy to use. There was some confusion, however, on the difference between adding/editing actors on the master actor list and adding/deleting actors from a specific process. This confusion highlighted a need to improve the Process Modeler's user interface for the Actor Panel to clearly distinguish between these two actions. Regardless of these problems, all participants were able to assign actors to processes after some additional instruction.

The next step in the process, group review of the AFTO 107 process model to ensure consensus, was a challenge because of the number of processes and the several different categories of information captured for each process. CMI researchers decided to review the processes and their descriptions during the first pass through the model so that the group could initially focus on identifying all process actions correctly. During this

review, true integration of the model occurred as the group worked together to ensure that every action by one location had an appropriate response at another location. Also, the group checked that valid responses were identified for each feasible action outcome (e.g., accept or reject). Several processes were added during the review based on these criteria. Missing or incomplete descriptions were also corrected. Processes were then reviewed to ensure that actors were correctly identified for all sub-processes and individual actions. Next, triggers were validated for all high-level and non-sequential processes. The group did not bother to identify triggers for purely sequential actions when the trigger was obvious – simply the completion of the previous action. The graphical view of the AFTO 107 model was not used since it would have added significantly to the modeling time and the majority of the process actions were highly sequential and triggers generally provided sufficient clarification of the non-sequential actions. Finally, a few resources were identified when they represented a recurring problem area for the AFTO 107 process. The decision to review the model a category at a time worked very well. Although the first pass through the model was rather slow, passes to review other categories of information went very quickly since all participants were very familiar with the model. There was also very little movement between categories during the review. For example, there were only a few times that the process description had to be reviewed before an actor could be assigned. The majority of the time, the process name provided sufficient information.

After the group reached consensus on the AFTO 107 process model, the process hierarchy and process descriptions were copied to a GroupSystems Group Outliner session. Participants then used Group Outliner to identify AFTO 107 process problems and possible solutions to begin the process improvement brainstorming process. Finally, participants completed a GroupSystems Survey to get their feedback on the Process Modeler, the quality of the AFTO 107 process model, and the approach used to develop the model.

Outcome

The output from the meeting is included in Appendix A. The final AFTO 107 process model included 88 process nodes. Descriptions were provided for all processes. Most sub-process and action level processes had more than one actor identified as being responsible for accomplishing the process. Multiple actors were identified when (1) several offices played key roles in accomplishing the process or, (2) the responsibility for a process varied at different Air Force bases. The process of identifying actors seemed to really emphasize this latter problem. As discussed in the previous section, triggers and resources were also identified when appropriate.

Developing the AFTO 107 process model also seemed to emphasize other problems as well. During a short GroupSystems session at the end of the meeting, participants rapidly identified 16 problem areas and recommended possible solutions for approximately half the problems. Output from this activity is included in Appendix A.

Results of the survey conducted at the close of the session were very positive. Detailed survey results are included in Appendix A and are briefly summarized here. The average participant assessment of the AFTO 107 process model ranged from 4.0 to 4.2 (1 – poor, 5 – excellent) on all quality characteristics. The average rating of the meeting approach was even higher at 4.5 on a similar 5-point scale. Participants did suggest that both the process model and the overall meeting could have been improved with broader participation by: (1) Air Force staff and (2) other Air Force units.

Participants' assessments of the Process Modeler prototype were also extremely encouraging. Although participants strongly emphasized a few critically needed improvements, they still rated this first version of the Process Modeler a 4 (out of a possible 5) on all functionality, usability and ease of use questions except recovering from errors. This last rating was expected since the Process Modeler did have a few problems that required users to completely exit the tool, then restart the browser and reload the software and model whenever they occurred. Other recommended improvements included: (1) elimination of the continual redrawing/repositioning of the

process tree hierarchy each time anyone modified it, (2) addition of common editing capabilities such as cut and paste, and (3) extending the current process name limit from 40 characters to at least 60. The first recommendation was implemented prior to the second meeting of the technology demonstration, which is described next.

3.2.3 Phase 2: Same Time, Different Place Meeting

The second phase of the DOME Technology Demonstration was a same time, different place meeting held simultaneously at Mountain Home Air Force Base in Mountain Home, Idaho, and Robins Air Force Base in Warner Robins, Georgia, on 6 November 1998. The detailed description of this meeting follows the same format used to discuss the first meeting.

Task

The AFTO 107 process model was further refined during the second meeting of the technology demonstration using the same basic approach used in the earlier meeting. The primary task for this meeting, however, was to complete identification of AFTO 107 process problems and possible solutions, and to consolidate those solutions into a recommended process improvement action list.

Group

Eighteen Air Force personnel attended the kick-off for the meeting. However, only twelve actively participated throughout the entire meeting and remained to complete the questionnaire at the end of the meeting. A few participants left early, possibly because of the technology problems that slowed the start of the meeting. Other personnel left during the day because of other mission requirements, a common problem when meetings are held on-site. The Mountain Home logistician and engineer who participated in the first meeting were joined by eleven local maintenance, quality assurance, plans and scheduling, and other operational personnel at the Mountain Home AFB meeting location. The F-15 maintenance manager from one Air Force MAJCOM and the F-15 AFTO 107 manager and reengineering specialist from Warner-Robins Air Logistics Center were joined by an engineer from the F-15 project office and the DOME project manager at the Robins AFB meeting site. New military and civilian participants

generally had less experience than the first meeting participants, dropping the average total experience for all participants to just under 20 years experience and average AFTO 107 experience to 8.5 years. New participants were not familiar with the DOME project. While most participants used computers at least several times a day and had good to very good experience using an Internet browser, they all reported limited or no GroupSystems or modeling experience.

The three CMI researchers from the first meeting also facilitated and observed the second meeting, two at Mountain Home and one at Robins AFB.

Context

The second meeting of the technology demonstration was conducted as a same time, different place meeting using the new GroupSystems meeting facilities set-up at Mountain Home and Robins AFBs as part of the DOME contract. The meeting was scheduled for 0730 – 1230 MST (0930 – 1430 EST) to accommodate the time differences between the two sites. Technical support was provided by a combination of communications and computer Air Force and contractor base support personnel at both locations. Technical specialists were supposed to test their individual components of the system prior to the meeting. However, as discussed in the next section, many technical problems still existed when CMI researchers arrived two days before the meeting. In addition, access to the Robins meeting room was limited to after hours because a non-DOME meeting was scheduled in the room for both days. This greatly complicated trouble-shooting at Robins and resulted in several problems during the meeting.

For this meeting, only the Air Force project manage, the MAJCOM representatives and CMI researchers were required to travel to attend the meeting. The elimination of the travel requirement significantly increased meeting participation, especially at Mountain Home AFB.

Technology

The facilitators and all meeting participants at both sites used personal computers connected to a local area network (LAN), and through the LAN, to the Internet.

Projectors were connected to the facilitator's workstations to provide a public display. The primary software used during this meeting was the Process Modeler prototype. CMI's Process Modeler server was used again, communicating with the remote meeting locations via the Internet. CMI researchers had to download and install Microsoft's Internet Explorer on all workstations prior to the meeting to support the Process Modeler clients.

GroupSystems software was also used during the meeting. Local participants used Citrix clients to connect via the Internet to CMI's GroupSystems Citrix server that was used to support the meeting. CMI researchers also had to download and install the Citrix client software on all participants' workstations prior to the meeting. Extensive testing and coordination with technical support personnel was required at Mountain Home to establish a working Internet connection for the meeting room and to allow access to CMI's servers through the local firewall. In addition, Process Modeler testing between the University of Arizona, Mountain Home, and Robins AFB indicated that Robins' poor Internet connectivity (frequent time-outs) caused unexpected missing process model data for some Robins participants.

Video teleconferencing (VTC) equipment was provided to both sites, also as part of the DOME contract, specifically to support distributed meetings such as the one planned for the technology demonstration. Mountain Home and Robins AFBs were responsible for providing the ISDN telephone lines required to operate the VTC equipment. CMI researchers arrived to find ISDN problems at both locations, indicating that the VTC equipment had not been tested as promised. Long hours of coordination with local communication personnel and the VTC vendor were required to get the VTC equipment operational. However, problems continued to plague the Robins location throughout the meeting, essentially making the VTC equipment more of a distraction than a help. The back-up audio-conferencing capability was also extremely limited due to low quality speaker-phones at both meeting locations.

Process

The meeting began with a welcome from the CMI researchers at Mountain Home, followed by a brief presentation by the CMI researcher at Robins on the goals of the DOME technology demonstration, specific meeting goals and general meeting guidelines. Because of lack of presentation software on Mountain Home participant's computers, this presentation could not be displayed on participants' workstations and had to be displayed using the CMI researcher's laptop connected to the projector. The plan was then to have all meeting participants introduce themselves using VTC, but VTC problems made this impossible. Participants did sign-in using GroupSystems Topic Commenter.

The Process Modeler prototype was introduced next using the same training procedure and "Go TDY" model used in the first meeting. All participants at both locations then had the opportunity to practice adding and modifying information in the model.

CMI researchers at Mountain Home then facilitated a chauffeured review of the AFTO 107 process model developed during the first technology demonstration meeting. The purpose of this review was to: (1) familiarize new participants with the model, (2) have all participants recommend improvements and changes to the model, and (3) achieve group consensus on model content. Initially, all participants reviewed the model on their personal workstations with changes made by both the facilitator and participants. However, part way through the review, Mountain Home AFB lost Internet connectivity for the entire base for over an hour. CMI researchers quickly dialed into the CMI Process Modeler server using a personal laptop and connected the laptop to a projector so that Mountain Home participants could follow the review using the public screen. Robins AFB participants maintained their Internet connection, so they could continue to review the model at their personal workstations or at their neighbor's workstation when poor connectivity caused data loss at their workstation. Throughout the review, the two meeting locations were connected via audio conferencing so that the participants from Robins could hear the facilitator's comments and ask questions/make comments as desired. Both locations had a very difficult time following group discussions at the other

site. In addition, Robins participants requested clarification of what process node was currently being reviewed, since they had no way of viewing what node the facilitator was highlighting. The entire review was extremely time consuming because of the technology problems, poor inter-site communication, and the length of the model. Some participants seemed to lose interest, buy many important improvements were made to the model during the review.

Following the chauffeured review, participants were asked to work in parallel to identify AFTO 107 process problems and recommend improvements. A new process information panel was added by the facilitator to the Process Modeler to specifically capture these problems and solutions. Problems and solutions identified during the first meeting were copied onto these panels for the appropriate process prior to the meeting. After participants completed their input, one CMI researcher at Mountain Home led both sites through a chauffeured review of the problems and solutions. Participants discussed and clarified solutions and then recommend specific process improvement action items needed to start implementation/evaluation of those solutions. A second CMI researcher at Mountain Home recommended these action items in a GroupSystems Categorizer session.

The meeting concluded with an overview of plans for the next meeting, a short training session on the GroupSystems tools that would be used in that meeting. Finally, the twelve remaining participants used GroupSystems Survey to complete a questionnaire similar to the one used in the first meeting.

<u>Outcome</u>

Output from the second meeting is included in Appendix B. The final AFTO 107 process model increased from 88 to 93 process nodes. Descriptions, actors, triggers, and resources were added or modified when required. Approximately 40 problems and 40 proposed solutions were also documented as part of the process model, up from the 16 problems and 8 solutions identified during the first meeting. The 40 proposed solutions

were combined into 9 recommended process improvement action items that were documented using GroupSystems. Output from this activity is included in Appendix B.

Results of the survey conducted at the close of the session were again very positive. Detailed survey results are included in Appendix B and are briefly summarized here. The average participant assessment of the AFTO 107 process model ranged from 4.2 to 4.5 (up from 4.0 – 4.2) on all quality characteristics. Quality of the recommend improvements averaged 4.2. The average rating of the overall meeting approach did drop slightly from 4.5 to 4.3, but participants rating of the distributed aspects of the meeting averaged an extremely high 4.5 to 5.0. Participants did indicate some difficult in working with participants at the other meeting location, rating this item 3.5, a full point lower than the 4.5 rating for working with participants at their location.

Process Modeler problems with the constant redrawing/repositioning of the process hierarchy identified during the first meeting were resolved prior to the second meeting. This change, possibly combined with some participant's familiarity with the tool, resulted in participant's assessment of the Process Modeler prototype's ease of use increasing from 4.1 to 4.3. The major problem identified during this meeting was the missing data caused by Robins' poor Internet connectivity. Some participants also provided some interesting recommendations for improvement, but in general, all participants were remarkably positive about the prototype.

3.2.4 Phase 3: Different Time, Different Place Meeting

The third and final phase of the DOME Technology Demonstration was a different time, different place meeting held from 11 – 27 January 1999 with wing, MAJCOM, and depot personnel participating directly from their offices at their convenience during that time-frame. The following detailed description of this meeting uses the same format as the first two meeting descriptions.

Task

During the final meeting, participants were asked to comment on the recommended AFTO 107 process improvement action list developed during the second meeting, and then to vote on the importance and feasibility of each of the recommended action items.

Group

All participants from the first two technology demonstration meetings were invited to participate in the final meeting.

Context

The final meeting of the technology demonstration was conducted as a different time, different place meeting with participants using their personal computers to participate directly from their desktops at their convenience. CMI researchers set-up and monitored the meeting from the University of Arizona. No facilitators or Air Force personnel were required to travel to participate in this fully distributed meeting. The lack of travel should have significantly increased participation, however, the lack of motivation to participate during an established time frame seemed to be a stronger factor and negatively impacted meeting participation.

Technology

The primary software used during this meeting was GroupSystems. Local participants used Citrix client software to connect via the Internet to CMI's GroupSystems Citrix server. CMI researchers had installed the necessary Citrix software on the personal computers of WR-ALC participants. Mountain Home participants had to install this software on their own computers by downloading it from Mountain Home's intranet site. Other participants had to download the software (for free) from the vendor. All participants used an Internet browser (which they may also have had to install) to access CMI's DOME Citrix web site to login to the GroupSystems session. Complete instructions were provided to all participants via Email, with follow-up support provided by CMI researchers by phone and Email. Although some participants had questions, everyone who requested assistance was eventually able to login to the GroupSystems

session. Instructions were also provided on how to access Process Modeler to view the final AFTO 107 process model, but no participants seemed to use this capability.

Process

During the first week of the meeting, participants were asked to login to GroupSystems to review and comment on the action items developed during the previous meeting. Instructions for adding new items and comments were provided via Email. At the beginning of the second week, CMI researchers shifted the 10 action items to two votes: (1) the importance of each action item for improving the AFTO 107 process and (2) the feasibility of each action item being implemented by Air Force. Again, complete instructions were provided by Email. Participants had just over one week to login to GroupSystems and record their votes.

CMI researchers monitored participation throughout the entire two and a half week meeting, sending Emails encouraging participation and offering assistance mid-way through each week with status messages provided at the end of each week. Both activities were extended because of low participation, but this had only a limited impact on the vote and no apparent impact on the initial comment activity.

Outcome

Participation during this final meeting was very disappointing. During the review of the recommended AFTO 107 process improvement action list, only one new action and one comment were added by participants (see Appendix C). Seven participants did vote on the importance of these action items, with five of those also voting on their feasibility. The voting results show some interesting similarities and differences between the importance and feasibility of the recommended action items. For example, both votes rated establishing and standardizing on a single central 107 POC as the top two items. In contrast, Air Staff funding of a real-time system was rated as the third most important, but the least feasible improvement action. Detailed voting results are included in Appendix C.

3.3 Cost-Benefit Analysis

There were many tangible and intangible benefits of using the DOME methodology to improve the AFTO 107 process, especially in a distributed environment. Some of these benefits, such as the improved quality of the AFTO 107 process model and recommended improvements, have already been mentioned in the previous sections.

An additional tangible benefit of the DOME approach is the significant man-hour and cost savings for Air Force representatives who did not need to travel to participate in these meetings. An estimate of these savings for the two distributed technology demonstration meetings is shown in Table 3. Estimates are based on the assumption that

Description	**Meeting 2**	**Meeting 3 (Invited)**	**Meeting 3 (Actual)**
Total Air Force Representatives	17	18	7
- # Representatives traveling to meeting	2	0	0
# Representatives participating without travel	15	18	7
Estimated meeting plus travel time	3 days	2 days	2 days
Average per person travel costs	$810	$690	$690
Total travel cost avoidance	$12,150	$12,420	$4,830
Per person lost productivity due to travel	16 hours	12 hours	12 hours
Total lost productivity	240 hours	216 hours	84 hours

Table 3. Travel Costs

Air Force representatives would have traveled to the University of Arizona's meeting facilities if the Mountain Home and Robins meeting rooms had not been built as part of the DOME contract. Since meeting two was a full-day meeting, it was assumed that participants would require approximately one day for travel to the meeting and a second day to return home. Meeting three could have been accomplished in a few hours during a face-to-face meeting, so it was assumed that participants could have returned home later

that same day. Travel costs were estimated based on an average $500 for airfare, $85 hotel plus $38 per day for per diem (Tucson 1998 rates), and $45 per day for rental car (one car for each three travelers).

Total cost avoidance for just the two distributed technology demonstration meetings was approximately $24,570 and 456 man-hours. In addition, in a face-to-face environment, all attendees of meeting 3 would have fully participated in the meeting activities. Even when conservatively considering only those Air Force representatives who participated in the final meeting, the cost avoidance was $17,250 and 324 man-hours.

4.0 CONCLUSION

4.1 Summarization of Results and Lessons Learned

Strategic Planning

DOME support can improve the strategic planning processes of the Air Force. DOME-supported strategic planning allowed a Wing of several thousand people to meet and develop a holistic strategic plan in less than three months, and allowed each level of the Wing to build on the previous level's ideas and comments. DOME allowed hundreds of people to be directly involved the strategic planning process. Involving large numbers of personnel in the planning process helps produce a high quality product that could not be developed practically using traditional face-to-face methodology. The result was higher quality strategic plans developed in less time than traditional strategic planning methods.

Distributed Facilitation

Asynchronous sessions are defined as those in which the users participate in different time/different place mode. Several early asynchronous GSS sessions had difficulties for a number of reasons. One real "*show stopper*" was when people did not participate at all when they logged in or they failed to log into the system at all. Interviews and observations suggest that people experience high ambiguity working asynchronously. They lack the cues available in synchronous interactions that help them to eliminate uncertainty and ambiguity. Without cues and direct immediate communication through which to ask questions for clarification, participants struggle to understand the meaning of facilitator instructions, shared objects, and the contributions of others. Minimal or no feedback makes participants feel alone and may cause them to question whether their efforts are warranted or will even be noticed. They aren't sure who will see their work, or how it might be interpreted. They therefore chose not to participate.

In order to overcome the problems encountered in sessions, we developed a distributed facilitation process that consisting of eight (8) rules-of-thumb to serve as a set of steps the facilitator can follow to engage participants and keep then involved in the process. Each

rule-of-thumb is described below. These eight (8) rules-of-thumb resulted mainly from experiences using the software in face-to-face and distributed settings. These techniques may help facilitators initiate and sustain successful asynchronous interactions.

Distributed Facilitation Process Rules-of-Thumb

1. Select a task(s) in which participants have high vested interests.

   Participants were mostly middle and senior-level managers with multiple responsibilities competing for their attention. Asynchronous sessions are more difficult and require more attention resources than synchronous ones. As a result, if participants don't have high vested interest in the goals or outcomes of an asynchronous session, other demands will consume their attention. Without pre-specified times and places for attendance, sessions cannot not compete for the users' attention. However, if participants have a high stake in the goals and outcomes, this may enable them to focus enough attention to keep the process moving.

2. Establish a champion with clout and vested interest.

   This is one way to create vested interest in participation. As one highly-placed leader said, "*The rule here is, if my boss is interested, I'm excited.*" Thus it is useful if "*someone at the top*" thinks the session is important and lack of participation may be noticed in a negative light, whereas meaningful participation may also be noticed in a positive light.

3. Explicitly verify the task cannot be accomplished more easily by another method.

   Group members that thought there was an easier way to accomplish the task typically never participated in asynchronous sessions. The team leader and facilitator must ask each participant well before the session, "*Can you think of an easier way we can do this?*" It was important that participants explicitly notice for themselves that an asynchronous session was the easiest way to accomplish the team goals.

4. Facilitator must directly contact all participants to confirm commitment to participate.

   Because asynchronous sessions are harder to execute and easier to ignore than synchronous ones, facilitators need to pick up the phone and speak directly to

every participant and get specific commitments to participate. Further, facilitators need to walk each group member on a tour of a well prepared virtual collaboration space before work begins and explain the task, the process, the collaborative objects, and answer any questions the group member asks.

5. Each distributed project should kick-off with a same-time-different-place voice-and-DOME on-line activity.

The kick-off event allows participants to become familiar with the virtual collaboration space, with the process it is to support and with the other team members. It eliminates excuses about technical failures preventing participation. Questions such as the following are answered: How is the collaborative space organized? What is the purpose/meaning of each activity? Where should comments and contributions be submitted and at what level of detail? How do you move around the space and use the tools to participate? The synchronous kickoff event reduced ambiguity and uncertainty, and improved participation later on in session.

6. Two deliverables of the Kick-off session should be (A) an explicit prioritized set of action items for asynchronous participation and (B) a firm schedule for the next synchronous interaction.

Each action item must be very detailed and include an action, an actor, a deadline, a deliverable, and a method to measure the quality of the work. Making users aware of expectations, and the date for the next synchronous activity, creates a sense of accountability and helps them to commit to the project.

7. Participant instructions must be vastly more explicit than would be necessary for synchronous sessions.

If there is any way for participants to misunderstand written instructions they will do so. In asynchronous sessions teams or members may drift a long way into unproductive processes before facilitators identify and address problems. Once identified, it is difficult to signal the team that a shift of direction is needed. In synchronous sessions such changes of direction are implemented with a few words from the facilitator and a few questions from the group members. In asynchronous sessions, such interactions may last over a day or longer, depending

on how often the facilitator and participants log into the session. Therefore, asynchronous distributed sessions require a very, ***very*** explicit set of participant instructions, which should have been pilot, tested with several people to eliminate ambiguity. The instructions must be complete, unambiguous, specific, detailed, and easily understandable by all participants. No small order.

8. Every DOME Session should include a separate process channel monitored by the facilitator.

In synchronous DOME sessions, participants simply ask the facilitator questions to clarify process issues. In asynchronous distributed sessions both oral communication and sometimes even direct immediate feedback are precluded. Therefore, it is valuable to provide a "*back channel*" for discussing session, process and other non-task related information. Persistent chat windows proved effective for this purpose. In some cases e-mail also provide adequate support. Several of the sessions simply built in an extra topic for comments about the process and the facilitator monitored it regularly.

AI Facilitation

Tools have been built and tested that help with the visualization of group memory. There is a need to maintain organizational memory, and these tools help to manage the knowledge for that purpose. The text from group sessions is sorted, categorized, and mapped into relevant topics. The AI tools created for preprocessing do a simple form of machine learning called statistical learning, specifically multidimensional scaling. The advantage is that it remains immune to prejudices of the researcher in finding patterns. It does so by translating the dissimilarities into distances on a map. The disadvantage is that the patterns found may have no semantic content. Testing of these tools sought to verify that users would prefer one type of preprocessing. Results contradicted this, however, when it was found that multiple views were preferred.

Process Modeling

A process model represents a process and its related components in a time-dependent fashion. A process model also captures the decision logic that exists within the process. Thus, it represents which events occur in sequence and which events occur in parallel.

The time and resources associated both with events and chains of events may be captured. Process models may be used to document, analyze, and improve business processes. They are excellent for supporting analysis of how to reduce process and project cycle times. Process models support the design and evaluation of new processes before embarking on potentially expensive business or information system changes. Process visualization and analysis are greatly enhanced by process models. The ability to see where bottlenecks occur and how events are sequenced helps a team see what changes may simplify, shorten, and streamline a process. When appropriate, process models may also be used to support capture of the information necessary to construct simulation models. Simulation is especially helpful when process bottlenecks are not easy to diagnose or visualize. This often occurs when many constraints within a process impact throughput and productivity.

Although participation during modeling and analysis is important, the current commercially available modeling support tools were single-user tools. Moreover, these tools were designed for use by analysts rather than to support non-expert participants. Because a single user entered all input, these tools limited direct participation by stakeholders during what should have been a collaborative, team-based effort. Thus, CMI researchers designed and built a tool that did not have these restrictions, and provided support for multiple users.

Collaborative support is important for groups at the same location, but CMI researchers recognized that it would be beneficial if a tool existed to allow users in different locations to participate. In this way multiple users or subgroups can do some process mapping and review from remote locations. This allows remote access events to be interleaved with face-to-face meetings, thus reducing the amount of travel time and cost during process mapping and analysis. Work on the DOME research included building such a tool: the Process Modeler.

All DOME project and research goals for the Process Modeler were met, as clearly shown by its successful support of the technology demonstration. Some of the primary lessons learned from the demonstration include the following:

- A simple, easy-to-use interface is critical for the Process Modeler. Users were easily able to add comments to the free-form text panels (e.g., the description panel), but had more difficulty with the structured actor panel. The actor panel interface needs to be simplified.
- As the size of the Process Model increased, synchronous review of all model information with the entire group became problematic. For example, during the second meeting, some participants lost interest during the almost two-hour facilitated review and improvement of the model. Possible methods for avoiding this problem:
- The facilitator could review the model at a high-level only, and then have participants review and improve the model in parallel. Alternatively, if participants are familiar with Process Modeler, they should be asked to review the model before the meeting.
- During the review, some time was wasted reviewing items everyone agreed on. The review would have been much faster if the group could have focused discussion only on those processes or information panels about which the group had questions or with which participants disagreed. Process Modeler needs a way for participants to "mark" processes/comments to indicate their agreement or disagreement. This capability would allow participants to review the model in detail individually, either synchronously or asynchronously. The entire group could then quickly complete the review together by simply reviewing those areas "marked" by participants.
- In general, as the size of the group increases, the meeting will be more effective if more time is spent with participants working in parallel with less time spent on facilitated reviews and discussions.

- The use of video teleconferencing (VTC) would have been a valuable addition to the same time, different place meeting. As a minimum, starting the meeting with introductions where everyone could see participants at the other site would have improved inter-site communication between all participants. Because the VTC was not working, communication was limited to audio-conferencing, primarily between the facilitator and each site's participants versus directly between participants.
- Back-up capabilities are essential for all technology critical to meeting success. For example, during the second meeting, audio-conferencing was used when VTC failed and dial-up communications were used when Mountain Home's Internet connection went down. If these back-ups had not been available, the distributed meeting would have been cancelled.
- Participation in the different time, different place meeting was disappointing. This may have been caused by the delay between the second and third meetings or by lack of incentives for participation. Motivation would have been higher if it had immediately followed the second meeting or if participants knew that their input was critical for a scheduled follow-on meeting.

Opportunities for Use of Tools and Methodologies by Other AF Users

The DOME system has been installed and transitioned to MH AFB and WR AFB. However, the DOME tools and methodologies have great potential for use by many other organizations throughout the Air Force. DOME's collaborative meeting technology, for example, can be utilized by virtually any organization that regularly holds meetings. One organization at Robins AFB, the Procurement and Acquisitions Office (PK), is already using the tool (the DOME installation in the Robins RE office) for developing risk assessments of potential projects. They have found the tool so valuable and use it so often that they are considering building their own collaborative meeting room. Additionally, the Air Force Battle Lab at Mountain Home AFB has also expressed interest in using DOME in their work. The ActionPlanner and SenseMaker templates developed for DOME will be a tremendous aid to organizations unfamiliar with

conducting collaborative meetings. These templates provide very specific guidelines for using DOME for strategic planning type meetings.

The DOME collaborative process-modeling (PM) tool also has many potential uses throughout the Air Force. The PM tool can be used for modeling virtually any business process and the resulting model can be used for many purposes such as functional process improvement or training. The distributed capabilities of the tool make it ideal for modeling business processes that exist in many different locations.

4.2 Future Research

Distributed Tools

The DOME project and technology demonstration results highlighted several areas for future research and enhancement of distributed tools for process analysis and improvement. Proposed Process Modeler enhancements include:

- Improve tool reliability and communication robustness for poor direct or slow dial-up Internet connections.
- Enhance graphical process modeling component by simplifying the user interface, improving automatic layout of processes and links, and providing a capability to print graphical models.
- Add an import/export capability with GroupSystems and other modeling tools.
- Improve metrics component by analyzing which metrics to capture, developing panels to capture identified metrics, and exploring feasibility of export to simulation tools.
- Add new features to support distributed facilitation such as match views, participation monitoring and consensus polling.
- Easily used in a distributed same-time/ different-place or different-time/different-place setting
- Textual component used successfully in DOME technology demonstration

- Graphical component used very little; functional, but needs refinement

The success of the Process Modeler during the technology demonstration proved the feasibility of this concept and opens the door for research into other collaborative Java-based tools. For example, a simplified collaborative writing tool specifically designed to work over the Internet would allow simple administration and writing of a wide-variety of documents by distributed and/or asynchronous participants. The objective of research on a Java GroupWriter would be to develop user requirements and a prototype of a tool for collaborative writing of multi-author documents (e.g., policy documents) in the Java programming language. Potential benefits of preparing a collaborative document using Java GroupWriter include: (1) increased information sharing, (2) decreased turnaround time, and (3) increased interest and contributions. In addition, the wider participation of collaborative writing process should improve document quality and increase user buy-in.

Facilitation

This research extends the knowledge about distributed DOME facilitation, participation, and leadership by involving users in the field. Observations of these sessions by researchers, facilitators, team leaders, and participants reveal new insights and lead to the development of a Distributed Facilitation Process that is tested in the field and demonstrated to greatly improve both processes and outcomes. This process provides a foundation from which to continue research to discover the underlying mechanisms that cause the steps in the process to be effective. Following are some additional distributed facilitation technical challenges that researchers and developers will have to address.

- Additional mechanisms for tracking data links help facilitators maintain awareness of participants with data links but without audio links.
- There is a strong need to integrate the audio and data links in such a way that the facilitator can track which participants are connected via audio and/or data.

- Protocols for voice and data communications help to eliminate confusion and orientation time at session initiation and when participants exit a session.

Future research should include doing additional field sessions, as well as both theory development and experimental verification to gain an understanding of the underlying constructs and their affects on collaborative productivity for distributed teams.

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APPENDIX A – MEETING 1 OUTPUT

Meeting 1 Output

Process Modeler Report

Session Name:	Process AFTO 107 Requests for Tech Asst
Report Generated :	10/21/98, 9:45:30 AM

Process Tree Hierarchy

Process AFTO 107 Requests for Tech Assist

- Determine Repair Needs
    - Research Repair Requirements
        - Research Repair in Technical Orders
        - Review Other Related Manuals
        - Contact Other Bases for Similar Problems
        - Review Maintenance History
    - Determine if Capability is at Base Level
    - Contact Depot for Special Assistance
    - Determine Parts Availability
    - Determine Equipment Availability
- Repair Locally/Return to Operation
- Prepare & Submit 107 Request
    - Produce 107 Narr at Work Center Level
        - Describe Problem
        - Create Drawings & Other Items Req by Depot
        - Prepare Specific Depot Repair Request
    - Review 107 Narrative
        - Review Narrative for Completeness
        - Validate Local Resources
        - Determine Fleet Implications
        - Initiate 107 Checklist
    - Complete 107 & Submit Req for Assistance
        - Review 107 Narr/Checklist Completeness
        - Prepare 107 for Transmission
        - Submit 107 to MAJCOM/Depot
        - Verify with MAJCOM/Depot Receipt of 107
    - Change Aircraft/Equipment Possession
- Process 107 Request at MAJCOM
    - Receive 107 at MAJCOM
    - Evaluate 107 Request
        - Validate 107
        - Research 107

        - Request Additional Information from Unit
    - Certify funding is available for repair
        - Cost estimate pre-certification
        - Review Cost Prohibitive Estimates
    - Execute 107 Disposition
        - Forward 107 Certification
        - Forward 107 Disapproval
- Process MAJCOM Response at Wing
    - Provide Additional Information
    - Review MAJCOM Approval/Disapproval
    - Submit 103 to reflect Possession Change
- Process 107 Request at Depot
    - Receive 107 Request at Depot
        - Log-in 107
        - Send Copy of 107 to Engineering
    - Evaluate and Make Disposition of 107
        - Assign Priority to 107
        - Assign 107 to Engineer
        - Log-in to Tracking Database
        - Prepare Disposition
            - Review 107 Request
            - Review Drawings in Data Repository/TOs
            - Request Additional Info from Field
            - Develop Repair
        - Approve Disposition
    - Receive MAJCOM Cert/Disapproval
    - Execute Disposition of 107
        - Draft/Send Repair Disp Message to Unit
        - Prepare Costing & Pers Details for DFT
        - Prepare 206 for DFT Deployment
        - Request Applicable SOR
        - Prepare and Ship Tooling
        - Deploy DFT if applicable
- Process Depot Response at Wing
    - Notify Work Center of Depot Response
    - Provide Additional Information
    - Follow Depot Instructions
    - Order Parts and/or Equipment as Required
        - Research Required Parts and Equipment
        - Prepare & Submit Order for Parts & Equip
        - Receive Ordered Parts and Equipment
        - Follow up on Backordered Parts/ Equip

        - Notify Depot of Parts/Equipment Receipt
    - Repair Item/Return to Operation
        - Complete Temp Fix & Send Item to Depot
        - Coord Depot Field Team Repair Efforts
        - Follow Depot Guidance for Local Repair
        - Continue Operation of Item
        - Permanently Remove from Service
- Prepare & Submit Supp 107 As Reqd
- Verify 107 Completion
- Inspect Repair by QA
- Review Repair Documentation
    - Notify MAJCOM/Depot of Completion
    - Submit 103 to reflect Possession Change

Process: Process AFTO 107 Requests for Tech Assist

Description

1. Procedures for processing of an AFTO 107 request for technical assistance on aircraft/equipment/system that are in need of repair.

Trigger

1. Aircraft Failure or Problem

Overview

1. **Parent Process**: Root
2. **Number of Children**: 12

Process: Determine Repair Needs

Description

1. Determine the specific repair needs by using all available resources, to include CFT if available.

Trigger

1. Aircraft/Equipment/System Failure or Problem

Overview

1. **Parent Process**: Process AFTO 107 Requests for Tech Assist
2. **Number of Children**: 6

Actors

1. QA Personnel -
2. Maintenance Personnel -
3. Maintenance Personnel from other bases - Maintenance personnel that maintain like acft/equip/systems

Process: Research Repair Requirements

Description

1. Check specific aircraft Technical Orders and other related materials to determine repair procedures and level of repair (local or depot) allowed.

Trigger

1. Aircraft/Equipment/System Failure or Problem

Overview

1. **Parent Process**: Determine Repair Needs
2. **Number of Children**: 7

Actors

1. Maintenance Personnel -
2. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
3. QA Personnel -

Process: Research Repair in Technical Orders

Description

1. Review applicable TO to verify the type, procedures, and authorized level of repairs required.

Overview

1. **Parent Process**: Research Repair Requirements
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. Maintenance Personnel from other bases - Maintenance personnel that maintain like acft/equip/systems
3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
4. QA Personnel -

Process: Review Other Related Manuals

Description

1. Check message files, drawings, manufacturer manuals, bulletins, procedure TO, and Time Compliance TOs for assistance in determining repair procedures.

Overview

1. **Parent Process**: Research Repair Requirements
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -

2. Maintenance Personnel from other bases - Maintenance personnel that maintain like acft/equip/systems
3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Contact Other Bases for Similar Problems

Description

1. Contact other Air Force bases, Department of Defense, and government services with same aircraft that may have had similar problems and request documentation, when available.

Overview

1. **Parent Process**: Research Repair Requirements
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. Maintenance Personnel from other bases -
3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
4. QA Personnel -

Process: Review Maintenance History

Description

1. Review maintenance history using CAMS, Aircraft forms (781's), other 107's, and shop maintenance history for past repairs of a similar nature.

Overview

1. **Parent Process**: Research Repair Requirements
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -

Process: Determine if Capability is at Base Level

Description

1. Check specific aircraft TO's and other related items, verify whether or not the owning work center has equipment and knowledge to complete repair. This would also include consulting local subject matter experts AFETS/CETS and on-site CFT, if available.
2. CETS - Contract Engineering Technical Services

Overview

1. **Parent Process**: Determine Repair Needs
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Contact Depot for Special Assistance

Description

1. Contact Depot Equipment Specialists/Engineers for any unclear areas in the TO's or to determine if Depot will allow the owning work center to accomplish the repair.

Overview

1. **Parent Process**: Determine Repair Needs
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. QA Personnel -

Process: Determine Parts Availability

Description

1. Using the necessary TO's, determine which parts are needed for the repair. Determine if the needed parts are available at the owning work center or elsewhere on base. If parts are not available, determine if they are procurable or non-procurable.

Resources

1. Dollars to procure/ship parts can be a problem, especially at end FY.

Overview

1. **Parent Process**: Determine Repair Needs
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. Supply Personnel -

Process: Determine Equipment Availability

Description

1. Verify if special equipment is needed using TO's (see step A1.2). If equipment is needed, does the owning work center have the equipment? If not, does anyone on base? If not, is it procurable or non-procurable?

Resources

1. Dollars to procure/ship equipment can be a problem, especially at end FY.

Overview

1. **Parent Process**: Determine Repair Needs
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. Maintenance Personnel from other bases - Maintenance personnel that maintain like acft/equip/systems
3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Repair Locally/Return to Operation

Description

1. After a review of the local repair capability, it is determined that the aircraft can be fixed on site by local mechanics/engineers or it is determined that the aircraft does not need to be repaired at this time and can be returned to operations.

Trigger

1. Decision to Repair Locally

Overview

1. **Parent Process**: Process AFTO 107 Requests for Tech Assist
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. Maintenance Personnel from other bases - Maintenance personnel that maintain like acft/equip/systems
3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
4. QA Personnel -

Process: Prepare & Submit 107 Request

Description

1. Wing level coordinated effort with QA product improvement, Wing P&S, owning unit/backshop maintenance personnel and AFETS. QA's product improvement section should be the lead for preparing and submitting the AFTO 107 due to their technical background. Wing P&S should have secondary responsibility to provide the administrative checks and balances and proper notifications required.
2. Responsibility for submission of AFTO 107s varies from base to base and by MAJCOM. For example, Tyndall AFB has a Depot Liaison who is not part of Wing P&S or QA. The Depot Liaison processes and submits all 107s.

Trigger

1. Decision to Request Depot Assistance

Overview

1. **Parent Process**: Process AFTO 107 Requests for Tech Assist

2. **Number of Children**: 3

Actors

1. QA Personnel -
2. Wing P&S Personnel -
3. Maintenance Personnel -
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Produce 107 Narr at Work Center Level

Description

1. Create a narrative for the 107 request form. This will be a very technically detailed narrative of the discrepancy. Prescribed format in T.O. 00-25-107 will be used as a guideline.

Trigger

1. Decision to request Depot repair assistance

Overview

1. **Parent Process**: Prepare & Submit 107 Request
2. **Number of Children**: 2

Actors

1. Maintenance Personnel -
2. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Describe Problem

Description

1. List detailed description and location of the discrepancy, describe the unsatisfactory condition, what has been done to try to correct it, and list the items that are damaged, missing, or needing repair.

Overview

1. **Parent Process**: Produce 107 Narr at Work Center Level
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. QA Personnel -

Process: Create Drawings & Other Items Req by Depot

Description

1. Process Name: Create Drawings, Diagrams, & Other Items Requested by Depot

2. Take measurements of damage or defects such as gaps, tears and holes. Include this on a drawings and list allowable limits from TO's. Take pictures (digital imaging) and create other visual aids that make the problem clearer.

Overview

1. **Parent Process**: Produce 107 Narr at Work Center Level
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. QA Personnel -
3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Prepare Specific Depot Repair Request

Description

1. List what you expect Depot to provide you, ask for guidance on level of repair, ask them to determine whether system is still usable, and for any temporary repair procedures. Include information concerning any upcoming deployments, phase inspections, or PDM input.
2. Note: Consider recommending change to TO 00-25-107 to require info on upcoming deployments, phase inspections, or PDM input.

Overview

1. **Parent Process**: Produce 107 Narr at Work Center Level
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. QA Personnel -
3. Wing P&S Personnel -
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Review 107 Narrative

Description

1. Review 107 narrative with owning work center for completeness and initiate the local 107 checklist/worksheet.

Trigger

1. Receipt of 107 Narrative from work center or Request for additional information

Overview

1. **Parent Process**: Prepare & Submit 107 Request
2. **Number of Children**: 6

Actors

1. QA Personnel -
2. Maintenance Personnel -

3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
4. Wing P&S Personnel -

Process: Review Narrative for Completeness

Description

1. Review narrative context for accuracy and ensure description of the problem is complete. Make sure all supporting documents are included.

Overview

1. **Parent Process**: Review 107 Narrative
2. **Number of Children**: 0

Actors

1. QA Personnel -
2. Maintenance Personnel -
3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Validate Local Resources

Description

1. Attempt to verify which equipment and parts are available at the work centers needed to complete the task.

Overview

1. **Parent Process**: Review 107 Narrative
2. **Number of Children**: 0

Actors

1. QA Personnel -
2. Maintenance Personnel -
3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Determine Fleet Implications

Description

1. Review seriousness of the problem, and determine if other aircraft/equipment may be affected, or have the same discrepancy.

Overview

1. **Parent Process**: Review 107 Narrative
2. **Number of Children**: 0

Actors

1. QA Personnel -
2. Maintenance Personnel -

3. Maintenance Personnel from other bases - Maintenance personnel that maintain like acft/equip/systems
4. Wing P&S Personnel -
5. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Initiate 107 Checklist

Description

1. Follow step by step instructions on 107 Request Checklist/Worksheet as applicable (see for example, MHAFBI 21-172 Attachment 2 checklist).

Overview

1. **Parent Process**: Review 107 Narrative
2. **Number of Children**: 0

Actors

1. QA Personnel -

Process: Complete 107 & Submit Req for Assistance

Description

1. Process Name: Complete 107 and Submit Request for Assistance
2. Ensure 107 is completed and submitted in the correct format to MAJCOM/DEPOT.

Trigger

1. Receipt of validated 107 narrative

Overview

1. **Parent Process**: Prepare & Submit 107 Request
2. **Number of Children**: 3

Actors

1. Wing P&S Personnel -
2. QA Personnel -

Process: Review 107 Narr/Checklist Completeness

Description

1. Process Name: Review 107 Narrative and Checklist for Completeness
2. Check 107 request form for completeness and accuracy. Review 107 checklist and all supporting materials for completeness.

Overview

1. **Parent Process**: Complete 107 & Submit Req for Assistance
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -

2. QA Personnel -
3. Wing P&S Personnel -

Process: Prepare 107 for Transmission

Description

1. Prepare E-Mail or Make Cover Sheet for FAX and put 107 request in message format using special computer program (Sarah Lite) IAW T.O. 00-25-107.
2. Note: Need to explore making this process real-time. As an interim solution, can an Email message totally replace the formal Sarah Lite message?
3. Preferred method of sending request to MAJCOM is via e-mail. Reference: Air Force Instruction (AFI) 33-12, "Information may be sent between offices or individuals, or be displayed on the web. The Air Force goal for the Internet is to provide maximum availability at acceptable risk levels for Air Force members needing access for the execution of official business." E-mail transmission allows for use of digital imaging to accompany depot maintenance requests.

Overview

1. **Parent Process**: Complete 107 & Submit Req for Assistance
2. **Number of Children**: 0

Actors

1. QA Personnel -

Process: Submit 107 to MAJCOM/Depot

Description

1. Send completed 107 and supporting materials to MAJCOM/Depot via FAX, E-Mail, or Base Communication Center.
2. Preferred method of sending request to MAJCOM is via e-mail
3. Occasionally, 107 requests are sent directly to depot without going through proper channels. Proper Procedures for Requesting Depot Maintenance Assistance

- Technical assistance requests will be forwarded directly to the depot unless directed by MAJCOM
- O& I Level maintenance requests will be forwarded to the MAJCOM for certification
- Unprogrammed depot level maintenance requests will be submitted through the MAJCOM for certification
- Re: T.O. 00-25-107, para 6.1, 6.2, 6.3

Overview

1. **Parent Process**: Complete 107 & Submit Req for Assistance
2. **Number of Children**: 0

Actors

1. QA Personnel -
2. Wing P&S Personnel -

Process: Verify with MAJCOM/Depot Receipt of 107

Description
1. Contact MAJCOM/Depot via Land Line or other means to ensure they received 107.
2. Note: If EMail was used, the Return Receipt capability will automatically provide this functionality.

Overview
1. **Parent Process**: Complete 107 & Submit Req for Assistance
2. **Number of Children**: 0

Actors
1. QA Personnel -
2. Wing P&S Personnel -

Process: Change Aircraft/Equipment Possession

Description
1. Wing P&S submits AFI 21-103 change of possession (e.g., BQ - waiting AFMC action/decision).

Trigger
1. Notification of 107 Submission

Overview
1. **Parent Process**: Prepare & Submit 107 Request
2. **Number of Children**: 0

Actors
1. Wing P&S Personnel -
2. QA Personnel -
3. Maintenance Personnel -
4. MOC - Maintenance Operations Center (Track Status of Aircraft/Equipment/System on a real time basis)

Process: Process 107 Request at MAJCOM

Trigger
1. Receipt of 107 Request

Overview
1. **Parent Process**: Process AFTO 107 Requests for Tech Assist
2. **Number of Children**: 2

Actors
1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Receive 107 at MAJCOM

Description
1. AFTO 107 submitted by Wing is received at MAJCOM by either through E-mail or FAX.

Trigger
1. Receipt of 107 Request

Overview
1. **Parent Process**: Process 107 Request at MAJCOM
2. **Number of Children**: 0

Actors
1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Evaluate 107 Request

Description
1. Ensure necessary information is included to help engineers determine repair disposition
2. Validate Date Time Group on Official Message is correct

Overview
1. **Parent Process**: Process 107 Request at MAJCOM
2. **Number of Children**: 3

Actors
1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Validate 107

Description
1. Validate Date Time Group is correct

Overview
1. **Parent Process**: Evaluate 107 Request
2. **Number of Children**: 0

Actors
1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Research 107

Description
1. Make sure all necessary information is included on the message to help engineers make proper repair disposition

Overview
1. **Parent Process**: Evaluate 107 Request
2. **Number of Children**: 0

Actors

1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

---

Process: Request Additional Information from Unit

Description

1. If necessary, request additional information from the field (e.g., pictures or diagrams) to help engineers formulate repair procedures.

Overview

1. **Parent Process**: Evaluate 107 Request
2. **Number of Children**: 0

Actors

1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

---

Process: Certify funding is available for repair

Description

1. Ensure sufficient DPEM (Depot Purchased Equipment Maintenance) is available to fund repair.

Overview

1. **Parent Process**: Evaluate 107 Request
2. **Number of Children**: 1

Actors

1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

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Process: Cost estimate pre-certification

Description

1. Air National Guard and AFMC requires cost estimate from the Depot prior to MAJCOM Certification to verify if funds are available
2. AETC occasionally request cost estimate to determine available funding.

Overview

1. **Parent Process**: Certify funding is available for repair
2. **Number of Children**: 0

Actors

1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

---

Process: Review Cost Prohibitive Estimates

Description

1. Coordinate with Air Staff for possible attrition action if cost to repair exceeds economic limits.

Trigger

1. Extensive damage causing prohibitive cost

Overview

1. **Parent Process**: Certify funding is available for repair
2. **Number of Children**: 0

Actors

1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Execute 107 Disposition

Description

1. MAJCOM MDS/System Functional Manager coordinates and sends request to depot

Trigger

1. Completion of MAJCOM Evaluation

Overview

1. **Parent Process**: Process 107 Request at MAJCOM
2. **Number of Children**: 1

Actors

1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Forward 107 Certification

Description

1. MAJCOM sends 107 Certification Message to depot with CC to unit.

Overview

1. **Parent Process**: Execute 107 Disposition
2. **Number of Children**: 0

Actors

1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Forward 107 Disapproval

Description

1. Send disapproval to unit with CC to depot. Notify unit to accurately document time taken for an erroneous possession.
2. Note: May be some differences on TO/CC for individual MAJCOMs.

Overview

1. **Parent Process**: Execute 107 Disposition
2. **Number of Children**: 0

Actors

1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Process MAJCOM Response at Wing

Description

1. Disseminate to key players MAJCOM's response to the submitted 107.

Trigger

1. Receipt of MAJCOM Response or Request for Additional Information

Overview

1. **Parent Process**: Process AFTO 107 Requests for Tech Assist
2. **Number of Children**: 2

Actors

1. QA Personnel -
2. Wing P&S Personnel -
3. Maintenance Personnel -

Process: Provide Additional Information

Description

1. As requested, provide any additional information to MAJCOM. Contact key players for help.

Trigger

1. MAJCOM Request for Additional Information

Overview

1. **Parent Process**: Process MAJCOM Response at Wing
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
3. QA Personnel -

Process: Review MAJCOM Approval/Disapproval

Description

1. Review the Approval/Disapproval decision from MAJCOM. Request clarification if needed.

Trigger

1. Receipt of MAJCOM Response

Overview

1. **Parent Process**: Process MAJCOM Response at Wing
2. **Number of Children**: 0

Actors

1. QA Personnel -
2. Wing P&S Personnel -
3. Maintenance Personnel -

Process: Submit 103 to reflect Possession Change

Description

1. If 107 disapproved, Wing P&S submits AFI 21-103 returning system to appropriate possession code.

Trigger

1. Receipt MAJCOM Response

Overview

1. **Parent Process**: Process MAJCOM Response at Wing
2. **Number of Children**: 0

Actors

1. Wing P&S Personnel -
2. Maintenance Personnel -
3. MOC - Maintenance Operations Center (Track Status of Aircraft/Equipment/System on a real time basis)

Process: Process 107 Request at Depot

Description

1. Receive 107 request from Unit/MAJCOM and prepare repair disposition.

Trigger

1. Receipt of 107 Request

Overview

1. **Parent Process**: Process AFTO 107 Requests for Tech Assist
2. **Number of Children**: 3

Actors

1. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)
2. Depot Engineering Personnel - Engineering supervisors, secretaries, and engineers at Depot

---

Process: Receive 107 Request at Depot

Description

1. Receive 107 from unit via official formal message, e-mail or fax.

Trigger

1. Receipt of 107 Request

Overview

1. **Parent Process**: Process 107 Request at Depot
2. **Number of Children**: 1

Actors

1. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Log-in 107

Description

1. Receive 107 from unit and log-in to database system and/or manual system.

Overview

1. **Parent Process**: Receive 107 Request at Depot
2. **Number of Children**: 0

Actors

1. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Send Copy of 107 to Engineering

Description

1. A memo requesting repair disposition, including parts list plus any applicable T.O. figure and index, grounding or flying decision, and SOR (Source of repair: CFT/DFT/O&I/PDM/DIM, etc.) is attached to the -107 and sent to engineering via e-mail or fax.

Overview

1. **Parent Process**: Receive 107 Request at Depot
2. **Number of Children**: 0

Actors

1. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Evaluate and Make Disposition of 107

Description

1. Review 107 and prepare repair disposition. This includes the type of repair, level of repair, status of aircraft (grounded, flyable) or equipment/system, and parts/tooling requirements. Disposition is sent to Depot 107 Program Manager (e.g., LFPLW at WR-ALC) when completed.

Trigger

1. Receipt of 107 from Depot 107 Program Mgt Personnel

Overview

1. **Parent Process**: Process 107 Request at Depot
2. **Number of Children**: 4

Actors

1. Depot Engineering Personnel - Engineering supervisors, secretaries, and engineers at Depot

Process: Assign Priority to 107

Description

1. After the initial review of the 107 request, the supervisor assigns a priority to this 107 request.
2. The priority assigned to the 107 request can be influenced by importance of the aircraft/equipment/system to the mission, input from Commanders, and input from MAJCOM POCs.

Overview

1. **Parent Process**: Evaluate and Make Disposition of 107

2. **Number of Children**: 0

Actors

1. Depot Supervisor or Lead Engineer -

Process: Assign 107 to Engineer

Description

1. Determine which engineer has the expertise and/or time to work the 107

Overview

1. **Parent Process**: Evaluate and Make Disposition of 107
2. **Number of Children**: 0

Actors

1. Depot Supervisor or Lead Engineer -

Process: Log-in to Tracking Database

Description

1. Log the 107 in to the engineering database

Overview

1. **Parent Process**: Evaluate and Make Disposition of 107
2. **Number of Children**: 0

Actors

1. Depot Supervisor or Lead Engineer -

Process: Prepare Disposition

Description

1. Engineer conducts the necessary research, analysis, design and coordination to prepare the disposition

Overview

1. **Parent Process**: Evaluate and Make Disposition of 107
2. **Number of Children**: 3

Actors

1. Depot Engineering Personnel - Engineering supervisors, secretaries, and engineers at Depot
2. Depot Supervisor or Lead Engineer -

Process: Review 107 Request

Description

1. Assigned engineer receives the 107 request, reads the request and determines the next action.

Overview

1. **Parent Process**: Prepare Disposition

2. **Number of Children**: 0

Actors

1. Depot Engineering Personnel - Engineering supervisors, secretaries, and engineers at Depot

Process: Review Drawings in Data Repository/TOs

Description

1. Detailed drawings are available in the Data Repository and/or TOs and are reviewed as part of the process of developing the repair disposition.

Overview

1. **Parent Process**: Prepare Disposition
2. **Number of Children**: 0

Actors

1. Depot Engineering Personnel - Engineering supervisors, secretaries, and engineers at Depot
2. Depot Supervisor or Lead Engineer -

Process: Request Additional Info from Field

Description

1. After reviewing the 107 request, additional information may be requested from the field unit that submitted the request.

Overview

1. **Parent Process**: Prepare Disposition
2. **Number of Children**: 0

Actors

1. Depot Engineering Personnel - Engineering supervisors, secretaries, and engineers at Depot
2. Depot Supervisor or Lead Engineer -

Process: Develop Repair

Description

1. After all of the information is received and reviewed, a repair plan is developed by the engineer that details what needs to be done and which SOR will accomplish the repair.

Overview

1. **Parent Process**: Prepare Disposition
2. **Number of Children**: 0

Actors

1. Depot Engineering Personnel - Engineering supervisors, secretaries, and engineers at Depot
2. Depot Supervisor or Lead Engineer -

Process: Approve Disposition

Description

1. Supervisory or lead engineer reviews the disposition for technical adequacy.

Overview

1. **Parent Process**: Evaluate and Make Disposition of 107
2. **Number of Children**: 0

Actors

1. Depot Supervisor or Lead Engineer -

Process: Receive MAJCOM Cert/Disapproval

Description

1. Receive MAJCOM Certification of Disapproval.

Trigger

1. Receipt of MAJCOM Certification/Disapproval

Overview

1. **Parent Process**: Process 107 Request at Depot
2. **Number of Children**: 0

Actors

1. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Execute Disposition of 107

Description

1. Carry-out the disposition of the 107. This can include field-level repairs, depot drop-in maintenance, depot-level repair, satisfactory as-is, or repair by contract field team.

Trigger

1. Receipt of Disposition from Depot Engineering Personnel

Overview

1. **Parent Process**: Process 107 Request at Depot
2. **Number of Children**: 5

Actors

1. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Draft/Send Repair Disp Message to Unit

Description

1. Send courtesy copy of engineering repair disposition to unit and MAJCOM via e-mail or fax prior to official message.
2. Prepare and send official formal message to MAJCOM with CC to unit stating the disposition of the repair (type of repair, level of repair, flying status (grounded or flying), and parts/tooling required).

3. If MAJCOM disapproved 107, formal message sent closing 107 action.
4. Preferred method of transmission is through E-Mail

Overview

1. **Parent Process**: Execute Disposition of 107
2. **Number of Children**: 0

Actors

1. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Prepare Costing & Pers Details for DFT

Description

1. Prepare Costing and Personnel Details of DFT
2. Determine the cost of the repair, the personnel required, and the number of man-hours to complete the repair. This work is accomplished by the Workload/Planner and is done when a DFT will perform the repair.

Trigger

1. SOR Decision = DFT

Overview

1. **Parent Process**: Execute Disposition of 107
2. **Number of Children**: 0

Actors

1. Depot Workloader/Planner -

Process: Prepare 206 for DFT Deployment

Description

1. Complete the AFLC Form 206 electronically and forward to Program/Funds Control Division (LFC at WR-ALC). The 206 is a Temporary Work Request and vehicle/document that funds the applicable source of repair to repair the aircraft/equipment/system.

Trigger

1. SOR Decision = DFT

Overview

1. **Parent Process**: Execute Disposition of 107
2. **Number of Children**: 0

Actors

1. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Request Applicable SOR

Description

1. Request the applicable source of repair (SOR) that will complete the repair. The depot field team (DFT) can include personnel from the Combat Logistics Support Squadron (CLSS) or from civilian personnel.

2. Source of Repair (SOR) definitions - Depot field team (DFT), Contract field team (CFT), Organizational and Intermediate (O&I), Program Depot Maintenance (PDM), Drop-In-Maintenance (DIM), Aircraft Damage Repair (ADR).

Overview

1. **Parent Process**: Execute Disposition of 107
2. **Number of Children**: 0

Actors

1. Depot Workloader/Planner -
2. Depot Contract Field Team Program Manage -

Process: Prepare and Ship Tooling

Description

1. Based upon the requirements of the repair, Production Support Branch (e.g., LFPSI at WR-ALC) will assemble and ship required special tooling to the unit.

Overview

1. **Parent Process**: Execute Disposition of 107
2. **Number of Children**: 0

Actors

1. Depot Workloader/Planner -
2. Depot Transportation Personnel -

Process: Deploy DFT if applicable

Description

1. Upon verification that all parts and equipment are on-site at the unit, the DFT is deployed via commercial/military air or POV to make the repair. This process only takes place If DFT has been identified as the repair source.

Trigger

1. SOR Decision = DFT

Overview

1. **Parent Process**: Execute Disposition of 107
2. **Number of Children**: 0

Actors

1. Depot Field Team -

Process: Process Depot Response at Wing

Description

1. Review response from Depot and provide additional information, as needed. Follow all instructions received from the Depot. Disposition could require any of the following actions:

- Order parts and/or equipment
- Complete the repair locally under direction of Depot

- Assist as needed in the repair efforts of the Depot Field Team
- Perform temporary fix and send to Depot for repairs
- Continue operation without repairs, at this time - Permanently remove item from service.

Trigger

1. Receipt of Depot Response or Request for Additional Information

Overview

1. **Parent Process**: Process AFTO 107 Requests for Tech Assist
2. **Number of Children**: 2

Actors

1. Wing P&S Personnel -
2. QA Personnel -
3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
4. Maintenance Personnel -

Process: Notify Work Center of Depot Response

Description

1. Notify work center of any response received from Depot and take appropriate action.

Overview

1. **Parent Process**: Process Depot Response at Wing
2. **Number of Children**: 0

Actors

1. Wing P&S Personnel -
2. QA Personnel -

Process: Provide Additional Information

Description

1. Provide any additional information requested by the Depot. Contact appropriate work center for additional information and submit information to Depot.

Trigger

1. Request for Additional Information

Overview

1. **Parent Process**: Process Depot Response at Wing
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. QA Personnel -
3. Wing P&S Personnel -
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Follow Depot Instructions

Description

1. Follow all instructions received from the Depot pertaining to the repair or continued use of the equipment.

Trigger

1. Receipt of Depot Response

Overview

1. **Parent Process**: Process Depot Response at Wing
2. **Number of Children**: 1

Actors

1. Maintenance Personnel -
2. Wing P&S Personnel -
3. QA Personnel -

Process: Order Parts and/or Equipment as Required

Description

1. Research and order any parts and/or equipment required by the Depot or work center to accomplish repair, if not already on hand. Parts may be issued or be backordered and require lots of waiting.

Overview

1. **Parent Process**: Follow Depot Instructions
2. **Number of Children**: 4

Actors

1. Maintenance Personnel -
2. Supply Personnel -

Process: Research Required Parts and Equipment

Description

1. Find Stock or Part Numbers for the Parts or Equipment by using TO's, FedLog, and/or calling Depot for information.

Overview

1. **Parent Process**: Order Parts and/or Equipment as Required
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -

Process: Prepare & Submit Order for Parts & Equip

Description

1. Prepare necessary documents to order the required parts and/or equipment and submit it to appropriate agencies.

2. Note: Depot may or may not provide parts themselves depending on funding and parts availability (e.g., depot may need to manufacture parts).

Overview

1. **Parent Process**: Order Parts and/or Equipment as Required
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. Supply Personnel -

Process: Receive Ordered Parts and Equipment

Description

1. Receive the Parts/Equipment from Base Supply stock, from other bases, from the manufacturer or from the Depot.

Overview

1. **Parent Process**: Order Parts and/or Equipment as Required
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. Supply Personnel -

Process: Follow up on Backordered Parts/ Equip

Description

1. If the Parts or equipment are not available, then Supply will go to other bases, to the Depot, or to the manufacturer to retrieve them. The owning work center will keep track of the supplies that have not been issued by using a supply document number.

Overview

1. **Parent Process**: Order Parts and/or Equipment as Required
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. Maintenance Personnel from other bases - Maintenance personnel that maintain like acft/equip/systems

Process: Notify Depot of Parts/Equipment Receipt

Description

1. Notify Depot when all parts/hardware and applicable tooling/equipment are on site.

Overview

1. **Parent Process**: Order Parts and/or Equipment as Required
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. QA Personnel -
3. Wing P&S Personnel -

Process: Repair Item/Return to Operation

Description

1. Repair aircraft/equipment/system as directed and/or return to operation.

Overview

1. **Parent Process**: Follow Depot Instructions
2. **Number of Children**: 4

Actors

1. Maintenance Personnel -
2. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Complete Temp Fix & Send Item to Depot

Description

1. Follow all directions from Depot to accomplish a temporary fix of the problem. Send aircraft/equipment/system to Depot as required by Depot schedule.

Overview

1. **Parent Process**: Repair Item/Return to Operation
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
3. QA Personnel -

Process: Coord Depot Field Team Repair Efforts

Description

1. Process Name: Coordinate Depot Field Team Repair Efforts
2. After the initial meeting, coordinate with Depot, work center and any other shops required on when, where, and how the repair by the Depot Field Team will be accomplished.

Overview

1. **Parent Process**: Repair Item/Return to Operation
2. **Number of Children**: 0

Actors

1. Wing P&S Personnel -
2. QA Personnel -
3. Maintenance Personnel -

4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
5. Depot Field Team -

Process: Follow Depot Guidance for Local Repair

Description

1. Follow the guidance and repair action received from Depot to accomplish any O&I level repair of the aircraft/equipment/system.

Overview

1. **Parent Process**: Repair Item/Return to Operation
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. QA Personnel -
3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Continue Operation of Item

Description

1. Follow all guidance received from Depot for continued operation of the 'Satisfactory As-Is' aircraft/equipment/system.

Overview

1. **Parent Process**: Repair Item/Return to Operation
2. **Number of Children**: 0

Actors

1. Wing P&S Personnel -
2. Maintenance Personnel -

Process: Permanently Remove from Service

Description

1. If determination is made that it is not economically feasible to repair, permanently remove aircraft/equipment/system from service.

Overview

1. **Parent Process**: Repair Item/Return to Operation
2. **Number of Children**: 0

Actors

1. Air Staff -
2. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager
3. Maintenance Personnel -
4. Wing P&S Personnel -

Process: Prepare & Submit Supp 107 As Reqd

Description

1. If additional discrepancy discovered during repair, prepare and submit supplemental (new) 107 as previously defined.

Trigger

1. Identification of additional discrepancies during repair process

Overview

1. **Parent Process**: Process AFTO 107 Requests for Tech Assist
2. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
3. QA Personnel -

Process: Verify 107 Completion

Description

1. Ensure that all maintenance repair actions have been completed and that all documentation is signed.

Trigger

1. Repair action completed

Overview

1. **Parent Process**: Process AFTO 107 Requests for Tech Assist
2. **Number of Children**: 3

Actors

1. QA Personnel -
2. Maintenance Personnel -
3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
4. Wing P&S Personnel -

Process: Inspect Repair by QA

Description

1. QA inspector checks repair work to ensure that all required work/repair has been completed in a satisfactory manner and all required documentation is completed. Arrive at an acceptable solution if repair is not acceptable.

Overview

1. **Parent Process**: Verify 107 Completion
2. **Number of Children**: 0

Actors

1. QA Personnel -

Process: Review Repair Documentation

Description

1. Review appropriate repair documentation. Maintain copy for Base Historical records.

Overview

1. **Parent Process**: Verify 107 Completion
2. **Number of Children**: 0

Actors

1. QA Personnel -
2. Wing P&S Personnel -

Process: Notify MAJCOM/Depot of Completion

Description

1. Send final message to MAJCOM/Depot of completion of the work outlined in the 107.
2. Note: This is currently not being done by the Wing with regularity.

Overview

1. **Parent Process**: Verify 107 Completion
2. **Number of Children**: 0

Actors

1. QA Personnel -
2. Wing P&S Personnel -

Process: Submit 103 to reflect Possession Change

Description

1. Wing P&S submits AFI 21-103 to return aircraft/equipment/system to owning unit possession.

Overview

1. **Parent Process**: Verify 107 Completion
2. **Number of Children**: 0

Actors

1. Wing P&S Personnel -
2. MOC - Maintenance Operations Center (Track Status of Aircraft/Equipment/System on a real time basis)
3. Maintenance Personnel -
4. QA Personnel -

AFTO 107 Process - Problems/Solutions

Process AFTO 107 Requests for Tech Assist

Problem: The whole AFTO 107 submission process is too slow and time consuming. There is a valid need to fully automate the system to provide management with real time, quick decision making capability. Loop the unit/MAJCOM/Depot into a real time system.

Determine Repair Needs

Research Repair Requirements

Research Repair in Technical Orders

Review Other Related Manuals

Contact Other Bases for Similar Problems

Review Maintenance History

Problem: Current data bases are not user friendly which causes errors or blanks in maintenance history.

Determine if Capability is at Base Level

Contact Depot for Special Assistance

Problem: Contact, details, direction, etc. not always captured by individuals/shops/units make first contact which is lost to management as possible use in decision metrics.

Determine Parts Availability

Determine Equipment Availability

Repair Locally/Return to Operation

Many times local repair is not considered because Wing lacks a special tool or jig. Giving the Wings access to these tools would result in more local repairs.

Wings can approach Companies, i.e. Boeing, and/or specific depots, i.e. WR-ALC, to inquire about purchasing or manufacturing their own "special tooling". Drawings and/or specific information can be obtained through these services.

Prepare & Submit 107 Request

Problem: Focal point for release of depot maintenance assistance request is not standardized.
Possible solution: Supplement TO 00-25-107 with MAJCOM supplements.

Problem: Air Staff needs to standardize at wing level who is technically responsible/capable of providing the most descriptively thorough 107. Opinion of this working group is that QA is best choice and not P&S.

Problem: 107 submission process is slow....need to develop an on-line, real-time video conferencing capability to join unit/MAJCOM/Depot decision makers for fast disposition.

Produce 107 Narr at Work Center Level

Describe Problem

Create Drawings & Other Items Req by Depot

Problem: Due to current 107 submittal process, new technology is not always use to transmit necessary information for use by depots....i.e. digital camera shots.

Prepare Specific Depot Repair Request

Review 107 Narrative

Problem: TO 00-25-107 gives a specific format for requesting O&I level maintenance assistance, para 6.2. It does not give a format for requesting depot level maintenance assistance.
Possible solution: Submit AFTO FORM 22 to insert proper format for both types of maintenance requests.

Review Narrative for Completeness

Validate Local Resources

Determine Fleet Implications

Initiate 107 Checklist

Problem: Not all wings use checklist/sheet when processing 107s causing less than optimum input/concerns/information to MAJCOMs/depot

Complete 107 & Submit Req for Assistance

Problem: Air Staff needs to develop new program for 107 submittal based on computer program that requires all information be addressed before 107 can be submitted.

Review 107 Narr/Checklist Completeness

Problem: Para 7.1, TO 00-25-107, Format for submitting maintenance assistance, does not consider PDM input/deployment/phase time as a factor in determining economy of repair.

Possible solution: AFTO FORM 22, TO 00-25-107, to change this para to reflect these considerations.

Prepare 107 for Transmission

Submit 107 to MAJCOM/Depot

Problem: When requesting Unprogrammed depot level maintenance assistance, the requirement to use a message is unnecessary. "Messaging" requires use of SARA LITE which has always been awkward and time consuming to use. Current authorized process of e-mail "heads up copy", followed by a formal message is duplication of effort. Use of e-mail would increase the speed of disposition and provide the opportunity to exploit the benefit of digital imaging.

Possible solution: AFTO FORM 22 to change TO 00-25-107, para 6.2, to allow e-mail transmission of request in format specified in para 7.

Verify with MAJCOM/Depot Receipt of 107

Problem: Lack of automated 107 submission negates quick feedback loop to verify receipt.

Change Aircraft/Equipment Possession

Process 107 Request at MAJCOM

Receive 107 at MAJCOM

Evaluate 107 Request

Validate 107

Research 107

Request Additional Information from Unit

Certify funding is available for repair

Problem: TO 00-25-107, para 6.2 mentions certification by MAJCOM that all resources have been exhausted. It is assumed this certification also considers available funding. Para 6.3, with potentially much higher costs, makes no mention of "certification."

Possible solution: AFTO FORM 22 to TO 0-25-107 to standardize these two paragraphs.

Cost estimate pre-certification

Review Cost Prohibitive Estimates

Execute 107 Disposition

Forward 107 Certification

Forward 107 Disapproval

Process MAJCOM Response at Wing

Provide Additional Information

Review MAJCOM Approval/Disapproval

Submit 103 to reflect Possession Change

Problem: Loss of accurate reporting status due to slow 107 process....need to automate whole process.

Process 107 Request at Depot

Receive 107 Request at Depot

Log-in 107

Send Copy of 107 to Engineering

Evaluate and Make Disposition of 107

Assign Priority to 107

Assign 107 to Engineer

Log-in to Tracking Database

Prepare Disposition

Review 107 Request

Review Drawings in Data Repository/TOs

Request Additional Info from Field

Develop Repair

Approve Disposition

Receive MAJCOM Certification/Disapproval

Execute Disposition of 107

Draft/Send Repair Disp Message to Unit

Prepare Costing & Pers Details for DFT

Prepare 206 for DFT Deployment

Request Applicable SOR

Prepare and Ship Tooling

Deploy DFT if applicable

Process Depot Response at Wing

Notify Work Center of Depot Response

Provide Additional Information

Follow Depot Instructions

Order Parts and/or Equipment as Required

Research Required Parts and Equipment

Prepare & Submit Order for Parts & Equip

Receive Ordered Parts and Equipment

Follow up on Backordered Parts/ Equip

Notify Depot of Parts/Equipment Receipt

Repair Item/Return to Operation

Complete Temp Fix & Send Item to Depot

Coord Depot Field Team Repair Efforts

Follow Depot Guidance for Local Repair

Continue Operation of Item

Permanently Remove from Service

Prepare & Submit Supp 107 As Reqd

Verify 107 Completion

Inspect Repair by QA

Review Repair Documentation

Notify MAJCOM/Depot of Completion

Submit 103 to reflect Possession Change

Kick-Off Session Evaluation - Survey Results

Tool Functionality

1. The system allowed me to do everything I needed to develop the process model.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*1*
A(4)	*5*
N(3)	*0*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*A(4.17)*
STD	*0.41*

2. Developing the process model using this tool was:
Very Easy (VE), Easy (E), Average (A), Hard (H), Very Hard (VH)

Choices	*Count*
VE(5)	*2*
E(4)	*4*
A(3)	*0*
H(2)	*0*
VH(1)	*0*

Statistics	
Mean	*E(4.33)*
STD	*0.52*

3. What additional features would make it easier to develop a process model using this tool? (Open-Ended)

1. using a format similar to MICROFAX Form Flow
2. The availability to Cut and Paste would be useful.
If the screen would not reset every time someone made an input it would be easier to work.
3. Higher levels of authority....i.e. Air Staff representation to make decisions for further development/improvements of/to the AFTO 107 process.
4. Longer advance briefing

Tool Usability

4. The screen layout/design was clear and easy to use.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*3*
A(4)	*3*
N(3)	*0*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*SA(4.50)*
STD	*0.55*

5. What changes to the screen layout would make the tool easier to use? (Open-Ended)

1. Eliminate the blanking out screen and having to scroll down after each submission
2. Cut and paste.
Group selections/assembly
3. The process tree could be centered better

6. Understanding the instructions provided by the tool was:
Very Easy (VE), Easy (E), Average (A), Hard (H), Very Hard (VH)

Choices	*Count*
VE(5)	*2*
E(4)	*3*
A(3)	*1*
H(2)	*0*
VH(1)	*0*

Statistics	
Mean	*E(4.17)*
STD	*0.75*

7. If you encountered any errors, understanding the error messages was:
Very Easy (VE), Easy (E), Average (A), Hard (H), Very Hard (VH)

Choices	*Count*
VE(5)	*1*
E(4)	*4*
A(3)	*1*

H(2)	*0*
VH(1)	*0*

Statistics	
Mean	*E(4.00)*
STD	*0.63*

8. If you encountered any errors, recovering from the errors was:
Very Easy (VE), Easy (E), Average (A), Hard (H), Very Hard (VH)

Choices	*Count*
VE(5)	*0*
E(4)	*3*
A(3)	*3*
H(2)	*0*
VH(1)	*0*

Statistics	
Mean	*E(3.50)*
STD	*0.55*

Tool Ease of Use

9. Learning to operate the Process Modeler tool was easy for me.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*2*
A(4)	*4*
N(3)	*0*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*A(4.33)*
STD	*0.52*

10. I found it easy to get the Process Modeler tool to do what I wanted it to do.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*0*
A(4)	*6*
N(3)	*0*
D(2)	*0*

SD(1)	*0*

Statistics	
Mean	*A(4.00)*
STD	*0.00*

11. My interactions with the Process Modeler tool were clear and understandable.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*0*
A(4)	*6*
N(3)	*0*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*A(4.00)*
STD	*0.00*

12. I found the Process Modeler tool flexible to interact with.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*1*
A(4)	*4*
N(3)	*1*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*A(4.00)*
STD	*0.63*

13. It was easy for me to become skillful at using the Process Modeler tool.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*1*
A(4)	*5*
N(3)	*0*
D(2)	*0*
SD(1)	*0*

Statistics

Mean	*A(4.17)*
STD	*0.41*

14. Interacting with the Process Modeler tool did not require a lot of mental effort.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*1*
A(4)	*4*
N(3)	*1*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*A(4.00)*
STD	*0.63*

15. I found the Process Modeler tool easy to use.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*1*
A(4)	*5*
N(3)	*0*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*A(4.17)*
STD	*0.41*

16. What changes would you recommend to improve the ease of use of the Process Modeler tool? (Open-Ended)

1. Improve the disappearance and reappearance of the Process Modeler every time a change is made so that recovery brings you back to where you had highlighted and not at the top of the modeler every time.
2. none at this point
3. In the process model we used, the blinking screen whenever a change was made was disturbing and disruptive. Also whenever a change came through, the drop down chart returned to the top line even though I was working on a separate line entry.

Overall Assessment of the Tool

17. What did you like least about the Process Modeler tool? (Open-Ended)

1. See number 16
2. stated in earlier comment
3. The screen resetting after other user inputs
4. Lack of edit capability (copy/cut paste).
Constant jumping of fields during group activity.
5. See previous comments

18. What did you like best about the Process Modeler tool? (Open-Ended)

1. it's ease of use
2. Anonymity
3. Provides clear display of entire process for objective analysis.
4. Fun and easy to work with. Just needs a few bugs worked out.

19. If you could change only one thing in the Process Modeler tool, what would you tell the designers to change? (Open-Ended)

1. give the capability to make multiple selections
2. See 17
3. Reconsider the limit of 40 characters.
4. Stop interference with users screen during operation and inputs by other users.

AFTO 107 Process Model Quality

20. The overall quality of the AFTO 107 process model developed was:
Excellent (E), Very Good (VG), Good (G), Fair (F), Poor (P)

Choices	*Count*
E(5)	*2*
VG(4)	*2*
G(3)	*2*
F(2)	*0*
P(1)	*0*

Statistics	
Mean	*VG(4.00)*
STD	*0.89*

21. Personnel involved in the 107 Process could easily understand the meaning of the process model developed with a minimum amount of explanation.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*

SA(5)	*1*
A(4)	*5*
N(3)	*0*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*A(4.17)*
STD	*0.41*

22. The process model developed was:
Completely Correct (CC), Mostly Correct (MC), Average (A), Somewhat Incorrect (SI), Mostly Incorrect (MI)

Choices	*Count*
CC(5)	*0*
MC(4)	*6*
A(3)	*0*
SI(2)	*0*
MI(1)	*0*

Statistics	
Mean	*MC(4.00)*
STD	*0.00*

23. The process model developed was:
Very Complete (VC), Mostly Complete (MC), Average (A), Somewhat Incomplete (SI), Very Incomplete (VI)

Choices	*Count*
VC(5)	*2*
MC(4)	*3*
A(3)	*1*
SI(2)	*0*
VI(1)	*0*

Statistics	
Mean	*MC(4.17)*
STD	*0.75*

24. The process descriptions developed were:
Very Clear (VC), Mostly Clear (MC), Average (A), Somewhat Vague (SV), Very Vague (VV)

Choices	*Count*

VC(5)	*2*
MC(4)	*2*
A(3)	*2*
SV(2)	*0*
VV(1)	*0*

Statistics	
Mean	*MC(4.00)*
STD	*0.89*

25. How satisfied were you with the final AFTO 107 process model?
Very Satisfied (VS), Mostly Satisfied (MS), Average (A), Somewhat Unsatisfied (SU), Very Unsatisfied (VU)

Choices	*Count*
VS(5)	*1*
MS(4)	*5*
A(3)	*0*
SU(2)	*0*
VU(1)	*0*

Statistics	
Mean	*MS(4.17)*
STD	*0.41*

Meeting Approach

26. Using this approach to define the AFTO 107 process enabled me to accomplish this task quickly.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*5*
A(4)	*1*
N(3)	*0*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*SA(4.83)*
STD	*0.41*

27. I spent my time efficiently describing the AFTO 107 process.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*4*
A(4)	*1*
N(3)	*0*
D(2)	*1*
SD(1)	*0*

Statistics	
Mean	*A(4.33)*
STD	*1.21*

28. The meeting approach allowed me to everything I needed to do to define the AFTO 107 process.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*1*
A(4)	*4*
N(3)	*1*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*A(4.00)*
STD	*0.63*

29. How could the approach followed in the meeting to create/validate the AFTO 107 process be improved? (Open-Ended)

1. Disappointed in that the suggestion to review other bases -107 process only provided a list of apparent bias personal comments rather than the expected intended model process flow chart as first formulated and reviewed at/by Mountain Home AFB, ID.
2. Need to get all the players involved in this process.
All the MAJCOMS need to represented as well as Wing Schedulers.
3. Author of TO 00-15-107 should have been in attendance to explain/defend the current TO.
4. Again, have the proper level of authority/decision makers present....i.e. Air Staff policy makers.

30. How satisfied were you with the overall meeting approach?
Very Satisfied (VS), Mostly Satisfied (MS), Average (A), Somewhat Unsatisfied (SU), Very Unsatisfied (VU)

Choices	*Count*

VS(5)	*4*
MS(4)	*2*
A(3)	*0*
SU(2)	*0*
VU(1)	*0*
Statistics	
Mean	*VS(4.67)*
STD	*0.52*

Demographics

31. How many years have you been working for the military (combined active duty and civilian time)? (Assign a number)

Value	**Count**
20	*1*
22	*1*
23	*3*
32	*1*
Statistics	
Mean	*23.83*
STD	*4.17*

32. How many years have you been working with the AFTO 107 Process? (Assign a number)

Value	*Count*
1	*1*
4	*1*
11	*1*
15	*1*
22	*1*
23	*1*
Statistics	
Mean	*12.67*
STD	*9.09*

33. How often do you use a computer?
Select the appropriate response

[6] Several times each day

[0] Once a day
[0] Several times each week
[0] Once a week
[0] Rarely

34. How would you rate your expertise with use of Internet Browsers?
Excellent (E), Very Good (VG), Good (G), Fair (F), Poor (P)

Choices	*Count*
E(5)	*0*
VG(4)	*2*
G(3)	*3*
F(2)	*1*
P(1)	*0*

Statistics	
Mean	*G(3.17)*
STD	*0.75*

35. Before this meeting, how many times had you used GroupSystems?
Select the appropriate response

[0] Many times
[2] 2 -3 times
[1] 1 time
[3] Never

36. Before this meeting, how many times had you developed a process, activity, or similar type model?

[1] Many times
[2] 2 -3 times
[2] 1 time
[1] Never

APPENDIX B – MEETING 2 OUTPUT

Meeting 2 Output

Process Modeler Report

Session Name:	AFTO107 Distributed Meeting
Report Generated :	11/6/98, 3:02:55 PM

Process Tree Hierarchy

Process AFTO 107 Requests for Tech Assist

- **Determine Repair Needs**
  - **Research Repair Requirements**
    - **Research Repair in Technical Orders**
    - **Review Other Related Manuals**
    - **Contact Other Bases for Similar Problems**
    - **Review Maintenance History**
  - **Determine if Capability is at Base Level**
    - **Determine Parts Availability**
    - **Determine Equipment Availability**
    - **Determine Personnel Availability**
    - **Determine Funds Availability**
  - **Contact Depot for Special Assistance**
- **Repair Locally/Return to Operation**
- **Prepare & Submit 107 Request**
  - **Initiate 107 Checklist**
  - **Produce 107 Narr at Work Center Level**
    - **Describe Problem**
    - **Create/Collect Visual Aids**
    - **Collect Other Supporting Material**
    - **Prepare Specific Depot Repair Request**
  - **Review 107 Narrative**
    - **Review Narrative for Completeness**
    - **Validate Local Resources**
    - **Determine Fleet Implications**
  - **Complete 107 & Submit Req for Assistance**
    - **Review 107 Narr/Checklist Completeness**
    - **Prepare 107 for Transmission**
    - **Submit 107 to MAJCOM/Depot**
    - **Verify with MAJCOM/Depot Receipt of 107**
  - **Change Aircraft/Equipment Possession**
- **Process 107 Request at MAJCOM**
  - **Receive 107 at MAJCOM**

- Evaluate 107 Request
  - Validate 107
  - Research 107
  - Request Additional Information from Unit
  - Certify funding is available for repair
    - Cost estimate pre-certification
    - Review Cost Prohibitive Estimates
- Execute 107 Disposition
  - Forward 107 Certification
  - Forward 107 Disapproval

- Process MAJCOM Response at Wing
  - Provide Additional Information
  - Review MAJCOM Approval/Disapproval
  - Submit Msg to reflect Possession Change
- Process 107 Request at Depot
  - Receive 107 Request at Depot
    - Log-in 107
    - Send Copy of 107 to Engineering
  - Evaluate and Make Disposition of 107
    - Assign Priority to 107
    - Assign 107 to Engineer
    - Log-in to Tracking Database
    - Prepare Disposition
      - Review 107 Request
      - Review Drawings in Data Repository/TOs
      - Request Additional Info from Field
      - Develop Repair
    - Approve Disposition
  - Receive MAJCOM Cert/Disapproval
  - Execute Disposition of 107
    - Draft/Send Repair Disp Message to Unit
    - Prepare Costing & Pers Details for DFT
    - Prepare 206 for DFT Deployment
    - Request Applicable SOR
    - Prepare and Ship Tooling
    - Deploy DFT if applicable
- Process Depot Response at Wing
  - Notify Work Center of Depot Response
  - Lose Possession
  - Provide Additional Information
  - Follow Depot Instructions
    - Order Parts and/or Equipment as Required

Appendix B

            - Research Required Parts and Equipment
            - Prepare & Submit Order for Parts & Equip
            - Receive Ordered Parts and Equipment
            - Follow up on Backordered Parts/ Equip
            - Notify Depot of Parts/Equipment Receipt
        - Repair Item/Return to Operation
            - Complete Temp Fix & Send Item to Depot
            - Coord Depot Field Team Repair Efforts
            - Follow Depot Guidance for Local Repair
            - Continue Operation of Item
            - Permanently Remove from Service
- Prepare & Submit Supp 107 As Reqd
- Verify 107 Completion
    - Inspect Repair by QA
    - Review Repair Documentation
    - Notify Wing P&S of Completion
    - Notify MAJCOM/Depot of Completion
    - Submit Msg to reflect Possession Change

Process: Process AFTO 107 Requests for Tech Assist

Description

2. Procedures for processing of an AFTO 107 request for technical assistance on aircraft/equipment/system that are in need of repair.

Trigger

2. Aircraft Failure or Problem

Problems/Solutions

3. Problem: You still need to wait for the engineer to research the problem.
4. Problem: Cannot add it to the Maintainers Conference- already to much going on at this conference
5. Solution: Instead of an additional conference add a side meeting at an existing conference such as the Maintainers conference to discuss 107s.
6. Problem: The whole AFTO 107 submission process is too slow and time consuming. There is a valid need to fully automate the system to provide management with real time, quick decision making capability. Loop the unit/MAJCOM/Depot into a real time system.
7. Solution: Air Staff initiate and fund advanced, state-of-the-art, real time AFTO 107 submission/evaluation/validation/approval/disapproval process.
8. Problem: Different MAJCOMs/Depots doing their own repair initiatives, etc.
9. Solution: Establish an annual 107 Worldwide conference. Conference will give the added benefit of face to face contact additional time spent with experts in the field for exchange of ideas and experiences to take back to home bases.

Overview

1. **Parent Process**: Root
2. **Number of Children**: 12

Process: Determine Repair Needs

Description

2. Determine the specific repair needs by using all available resources, to include CFT if available.
3. Consult Air Force Engineers Technical Service (AFETS) personnel for additional expertise.

Trigger

2. Aircraft/Equipment/System Failure or Problem

Overview

3. **Parent Process**: Process AFTO 107 Requests for Tech Assist
4. **Number of Children**: 4

Actors

1. QA Personnel -
2. Maintenance Personnel -

Process: Research Repair Requirements

Description

4. Check specific aircraft Technical Orders and other related materials to determine repair procedures and level of repair (local or depot) allowed.

Trigger

2. Aircraft/Equipment/System Failure or Problem

Overview

2. **Parent Process**: Determine Repair Needs
3. **Number of Children**: 7

Actors

3. Maintenance Personnel -
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
5. QA Personnel -

Process: Research Repair in Technical Orders

Description

1. Review applicable TO to verify the type, procedures, and authorized level of repairs required.

Problems/Solutions

4. Problem: Specific area in question is not in T.O.
5. Solution: Contact DEPOT on Voice or E-Mail for Assistance in locating Info, or contact AFETS to see if engineering drawings are available locally

Overview

2. **Parent Process**: Research Repair Requirements
3. **Number of Children**: 0

Actors

3. Maintenance Personnel -
4. Maintenance Personnel from other bases - Maintenance personnel that maintain like acft/equip/systems
5. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
6. QA Personnel -

Process: Review Other Related Manuals

Description

1. Check message files, drawings, manufacturer manuals, bulletins, procedure TO, and Time Compliance TOs for assistance in determining repair procedures.

Overview

5. **Parent Process**: Research Repair Requirements
6. **Number of Children**: 0

Actors

2. Maintenance Personnel -
3. Maintenance Personnel from other bases - Maintenance personnel that maintain like acft/equip/systems
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
5. QA Personnel -

Process: Contact Other Bases for Similar Problems

Description

3. Contact other Air Force bases, Department of Defense, and government services with same aircraft/equipment that may have had similar problems and request documentation, when available.

Problems/Solutions

1. Solution: B-1 tech services maintains an on-line, web based database of maintenance assist requests and solutions. It is available for review by all B-1 units. Negates the need to generate another product, and ensures technicians with a need for the information can access it, vice a crosstell that may or may not get disseminated to the appropriate work centers
2. Solution: Encourage all units to send out cross tells to share repair ideas and initiatives
3. Problem: If another base has had the same problem and already have performed a fix we can not use it until we run the process over again.

4. Solution: Create a standardized library of repair initiatives on one web site, accessible to all wings (by type aircraft). This approach would have the follow-on benefit of capturing data for possible technical order changes, or reliability/maintainability modifications. Also worldwide availability of equipment could be identified at any time around the world.

Overview

4. **Parent Process**: Research Repair Requirements
5. **Number of Children**: 0

Actors

2. Maintenance Personnel -
3. Maintenance Personnel from other bases -
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Review Maintenance History

Description

3. Review maintenance history using CAMS, Aircraft forms (781's), other 107's, and shop maintenance history for past repairs of a similar nature.

Problems/Solutions

1. Problem: Current data bases (CAMS) are not user friendly which causes errors or blanks in maintenance history.

Overview

5. **Parent Process**: Research Repair Requirements
6. **Number of Children**: 0

Actors

2. Maintenance Personnel -
3. Wing P&S Personnel -

Process: Determine if Capability is at Base Level

Description

3. CETS - Contract Engineering Technical Services
4. Check specific aircraft TO's and other related items, verify whether or not the owning work center has equipment and knowledge to complete repair. This would also include consulting local subject matter experts AFETS/CETS and on-site CFT, if available.

Overview

1. **Parent Process**: Determine Repair Needs
2. **Number of Children**: 3

Actors

2. Maintenance Personnel -

3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Determine Parts Availability

Description

3. Using the necessary TO's, determine which parts are needed for the repair. Determine if the needed parts are available at the owning work center or elsewhere on base. If parts are not available, determine if they are procurable or non-procurable.

Resources

3. Dollars to procure/ship parts can be a problem, especially at end FY.

Problems/Solutions

1. Problem: A lot of times we need Depot to tell us what we will require. We have a lot of calls being made back and forth and a lot of telephone messages being left.

Overview

3. **Parent Process**: Determine if Capability is at Base Level
4. **Number of Children**: 0

Actors

2. Maintenance Personnel -
3. Supply Personnel -

Process: Determine Equipment Availability

Description

3. Also, may want to check with other bases for equipment availability.
4. Verify if special equipment is needed using TO's (see step A1.2). If equipment is needed, does the owning work center have the equipment? If not, does anyone on base? If not, is it procurable or non-procurable?

Resources

1. Dollars to procure/ship equipment can be a problem, especially at end FY.

Overview

3. **Parent Process**: Determine if Capability is at Base Level
4. **Number of Children**: 0

Actors

2. Maintenance Personnel -
3. Maintenance Personnel from other bases - Maintenance personnel that maintain like acft/equip/systems
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Determine Personnel Availability

Description

2. Determine if the performing work center has skilled technicians available to accomplish the required task.

Problems/Solutions

3. Solution: Include all shortfalls in the 107 or in the dialogue with engineer so that proper disposition as to whether a DFT or field repair is allowed.
4. Problem: Not all bases have technicians trained on required repairs
5. Solution: When training is being conducted at one base, Contact other bases with same equipment to see if they want to send technicians to get training Problem: Some bases have trained personal and equipment deployed so it leaves home station or deployed locations short

Overview

1. **Parent Process**: Determine if Capability is at Base Level
2. **Number of Children**: 0

Actors

3. Maintenance Personnel -
4. QA Personnel -

Process: Determine Funds Availability

Description

2. The funds needed to repair the item or system

Overview

2. **Parent Process**: Determine if Capability is at Base Level
3. **Number of Children**: 0

Process: Contact Depot for Special Assistance

Description

3. Note: If you do this include the person contacted in the 107 request.
4. Contact Depot Equipment Specialists/Engineers for any unclear areas in the TO's or to determine if Depot will allow the owning work center to accomplish the repair.

Problems/Solutions

1. Problem: There are sometimes several personal attempting to contact the Depot for information on the same malfunction. This can cause confusion both at the Depot and Field level.
2. Solution: This problem is eliminated when a wing focal point (i.e., QA) is identified as the single point within a wing for 107 requests Problem: Having a single point of contact sometimes leave less knowing people talking about the problem

3. Solution: Contacts should be limited to i.e., AFETS,QA or FLT/SHOP CHIEF's
4. Solution: See proposals under "Contact Other Bases for Similar Problems" node above to capture information
5. Problem: Having one point of contact sometimes leaves a less experience person talking to depot
6. Problem: Contact, details, direction, etc. not always captured by individuals/shops/units make first contact which is lost to management as possible use in decision metrics.

Overview

4. **Parent Process**: Determine Repair Needs
5. **Number of Children**: 0

Actors

2. Maintenance Personnel -
3. QA Personnel -
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Repair Locally/Return to Operation

Description

2. After a review of the local repair capability, it is determined that the aircraft/equipment/system can be fixed on site by local mechanics/engineers or it is determined that the aircraft/equipment/system does not need to be repaired at this time and can be returned to operations.

Trigger

3. Decision to Repair Locally

Problems/Solutions

1. Problem: Many times local repair is not considered because Wing lacks a special tool or jig. Solution: Giving the Wings access to these tools would result in more local repairs.
2. Solution: Wings can approach Companies, i.e. Boeing, and/or specific depots, i.e. WR-ALC, to inquire about purchasing or manufacturing their own "special tooling". Drawings and/or specific information can be obtained through these services.
3. Solution: Contact other bases to determine if tooling or equipment is available for use

Overview

5. **Parent Process**: Process AFTO 107 Requests for Tech Assist
6. **Number of Children**: 0

Actors

3. Maintenance Personnel -
4. Maintenance Personnel from other bases - Maintenance personnel that maintain like acft/equip/systems

5. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
6. QA Personnel -

Process: Prepare & Submit 107 Request

Description

2. 107 Request may be a Request for Technical Assistance or Maintenance Support Request. Tech Asst request does not require MAJCOM validation (unless otherwise directed by MAJCOM) and may be EMailed directly to depot. If the Tech Asst request is disapproved by the depot, then a 107 Maintenance Support Request must be initiated and submitted to the MAJCOM.
3. Wing level coordinated effort with QA product improvement, Wing P&S, owning unit/backshop maintenance personnel and AFETS. QA's product improvement section should be the lead for preparing and submitting the AFTO 107 due to their technical background. Wing P&S should have secondary responsibility to provide the administrative checks and balances and proper notifications required.
4. Responsibility for submission of AFTO 107s varies from base to base and by MAJCOM. For example, Tyndall AFB has a Depot Liaison who is not part of Wing P&S or QA. The Depot Liaison processes and submits all 107s.

Trigger

3. Decision to Request Depot Assistance

Problems/Solutions

1. Problem: The MAJCOM/Depot field 107's from many bases, How would you coordinate video conferences to satisfy all customers. I'm sure MH would not want to wait for a scheduled conference to discuss a repair. This problem is exacerbated by time differences between depots and operating locations around the globe
2. Problem: Focal point for release of depot maintenance assistance request is not standardized.
3. Possible solution: Supplement TO 00-25-107 with MAJCOM supplements. (This approach was adopted as an action item by the recent ACC LOCAT that visited Mountain Home AFB)
4. Problem: Air Staff needs to standardize at wing level who is technically responsible/capable of providing the most descriptively thorough 107. Opinion of this working group is that QA is best choice and not P&S.
5. Problem: 107 submission process is slow....
6. Solution: Need to develop an on-line, real-time video conferencing capability to join unit/MAJCOM/Depot decision makers for fast disposition.
7. Solution: The wings recognize this limitation, we are asking for the WHOLE process to be quicker.

Overview

5. **Parent Process**: Process AFTO 107 Requests for Tech Assist
6. **Number of Children**: 4

Actors

2. QA Personnel -
3. Wing P&S Personnel -
4. Maintenance Personnel -

Process: Initiate 107 Checklist

Description

2. Follow step by step instructions on 107 Request Checklist/Worksheet as applicable (see for example, MHAFBI 21-172 Attachment 2 checklist).

Problems/Solutions

3. Problem: The Depot does not know all the units needs, maybe the checklist should be approved by the MAJCOM.
4. Problem: Not all wings use checklist/sheet when processing 107s causing less than optimum input/concerns/information to MAJCOMs/depot.
5. Solution: Have all bases use standard check list approved by DEPOT's with the info needed by depot, after base can add to check list as needed
6. Solution: A checklist should be established and disseminated to all wings for inputs to be standardized

Overview

1. **Parent Process**: Prepare & Submit 107 Request
2. **Number of Children**: 0

Actors

3. QA Personnel -

Process: Produce 107 Narr at Work Center Level

Description

2. Create a narrative for the 107 request form. This will be a very technically detailed narrative of the discrepancy. Prescribed format in T.O. 00-25-107 will be used as a guideline.

Trigger

3. Decision to request Depot repair assistance

Overview

1. **Parent Process**: Prepare & Submit 107 Request
2. **Number of Children**: 3

Actors

3. Maintenance Personnel -
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Describe Problem

Description

3. List detailed description and location of the discrepancy, describe the unsatisfactory condition, what has been done to try to correct it, and list the items that are damaged, missing, or needing repair.

Problems/Solutions

3. Problem: Engineer may not understand what writer of narrative is trying to explain.
4. Solution: Writer of narrative contact DEPOT by voice and talk it out to until both parties are on the same page.
5. Solution: That is what the real time capability would allow us to do.....eliminate all the back and forth, waiting for a response via message traffic or e-mail....we would be able to see each representative, the pictures, drawings, etc. while on line.

Overview

1. **Parent Process**: Produce 107 Narr at Work Center Level
2. **Number of Children**: 0

Actors

4. Maintenance Personnel -
5. QA Personnel -
6. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Create/Collect Visual Aids

Description

3. Process Name: Create Drawings, Diagrams, & Other Items Requested by Depot
4. Take measurements of damage or defects such as gaps, tears and holes. Include this on a drawings and list allowable limits from TO's. Take pictures (digital imaging) and create other visual aids that make the problem clearer.

Problems/Solutions

3. Solution: E-mail is currently being used to forward digital pictures of damage.
4. Solution: ACC already funds the B-1's for their ETAR program with new computers, printers, digital cameras and software to support it.....what about the other flying units specifically F-15's?
5. Problem: Due to current 107 submittal process, new technology is not always used to transmit necessary information for use by depots....i.e. digital camera shots.
6. Solution: As part of Air Staff initiative and funding, each wing would receive necessary computers, digital cameras, training, etc. to allow for this capability.

Overview

1. **Parent Process**: Produce 107 Narr at Work Center Level
2. **Number of Children**: 0

Actors

5. Maintenance Personnel -
6. QA Personnel -
7. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Collect Other Supporting Material

Description

2. Include previous engineering dispositions authorizing permanent/temporary repairs for the system or adjacent components/structure.

Overview

2. **Parent Process**: Produce 107 Narr at Work Center Level
3. **Number of Children**: 0

Process: Prepare Specific Depot Repair Request

Description

3. List what you expect Depot to provide you, ask for guidance on level of repair, ask them to determine whether system is still usable, and for any temporary repair procedures. Include information concerning any upcoming deployments, phase inspections, or PDM input.
4. Note: Consider recommending change to T.O. 00-25-107 to require including info on upcoming deployments, phase inspections, or PDM input.

Problems/Solutions

1. Problem: Base may not have capability to do repair as depot specified.
2. Solution: When performing work center contacts depot, talk with engineer as to how work is to be accomplished and any short falls you may have

Overview

5. **Parent Process**: Produce 107 Narr at Work Center Level
6. **Number of Children**: 0

Actors

2. Maintenance Personnel -
3. QA Personnel -
4. Wing P&S Personnel -

Process: Review 107 Narrative

Description

3. Review 107 narrative with owning and performing work centers for completeness and initiate the local 107 checklist/worksheet.

Trigger

1. Receipt of 107 Narrative from work center or Request for additional information

Problems/Solutions

4. Problem: TO 00-25-107 gives a specific format for requesting O&I level maintenance assistance, para 6.2. It does not give a format for requesting depot level maintenance assistance.
5. Possible solution: Submit AFTO FORM 22 to insert proper format for both types of maintenance requests. (See discussions regarding standardization/use of a common 107 checklist in other nodes)

Overview

2. **Parent Process**: Prepare & Submit 107 Request
3. **Number of Children**: 5

Actors

3. QA Personnel -
4. Maintenance Personnel -
5. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Review Narrative for Completeness

Description

1. Review narrative content and supporting materials for accuracy and ensure description of the problem is complete. Make sure all supporting documents are included.

Overview

4. **Parent Process**: Review 107 Narrative
5. **Number of Children**: 0

Actors

2. QA Personnel -
3. Maintenance Personnel -
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Validate Local Resources

Description

3. Identify which equipment and parts are not available at the work centers needed to complete the task. This information should be included in the 107 Request.

Problems/Solutions

1. Problem: Base may have short falls in material, tooling or other areas.
2. Solution: Contact other bases to see if items can be used/ contact local businesses to see if items can be locally procured.

Overview

6. **Parent Process**: Review 107 Narrative
7. **Number of Children**: 0

Actors

2. QA Personnel -
3. Maintenance Personnel -
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Determine Fleet Implications

Description

3. Review seriousness of the problem, and determine if other aircraft/equipment may be affected, or have the same discrepancy.

Problems/Solutions

1. Problem: Lack of methodology/system to automatically perform this function.
2. Solution: As part of the Air Staff initiative, the program would automatically alert via the systems connections to all other wings of the fact there is a problem and possible need for a one time inspection.
3. OK

Overview

2. **Parent Process**: Review 107 Narrative
3. **Number of Children**: 0

Actors

3. QA Personnel -
4. Maintenance Personnel -
5. Maintenance Personnel from other bases - Maintenance personnel that maintain like acft/equip/systems

---

Process: Complete 107 & Submit Req for Assistance

Description

2. Process Name: Complete 107 and Submit Request for Assistance
3. Ensure 107 is completed and submitted in the correct format to MAJCOM/DEPOT.

Trigger

3. Receipt of validated 107 narrative

Problems/Solutions

1. Solution: Develop a Web-based form that asks for all of the required information, allows for drawings and digital pictures to be attached, and can be submitted to the appropriate agencies by clicking a button when finished.

2. (Again, refer to on-line process used for the B-1 program. It has mandatory data edits, and authorizations that prohibit transmission from base and MAJCOM until 'approval' authority validates the requirement.
3. Problem: Air Staff needs to develop new program for 107 submittal based on computer program that requires all information be addressed before 107 can be submitted.

Overview

3. **Parent Process**: Prepare & Submit 107 Request
4. **Number of Children**: 3

Actors

3. Wing P&S Personnel -
4. QA Personnel -

Process: Review 107 Narr/Checklist Completeness

Description

3. Process Name: Review 107 Narrative and Checklist for Completeness
4. Check 107 request form for completeness and accuracy. Review 107 checklist and all supporting materials for completeness.

Problems/Solutions

1. Problem: Para 7.1, TO 00-25-107, Format for submitting maintenance assistance, does not consider PDM input/deployment/phase time as a factor in determining economy of repair.
2. Possible solution: AFTO FORM 22, TO 00-25-107, to change this para to reflect these considerations, and build these considerations into the local checklist/review process.

Overview

4. **Parent Process**: Complete 107 & Submit Req for Assistance
5. **Number of Children**: 0

Actors

4. Maintenance Personnel -
5. QA Personnel -
6. Wing P&S Personnel -
7. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Prepare 107 for Transmission

Description

3. Include in the 107, as a REF: (reference) listed under the SUBJECT title, the name of any engineer that you have been in contact with.
4. Prepare E-Mail or Make Cover Sheet for FAX and put 107 request in message format using special computer program (Sarah Lite) IAW T.O. 00-25-107.

5. Note: Need to explore making this process real-time. As an interim solution, can an Email message totally replace the formal Sarah Lite message?
6. Preferred method of sending request to MAJCOM is via e-mail. Reference: Air Force Instruction (AFI) 33-12, "Information may be sent between offices or individuals, or be displayed on the web. The Air Force goal for the Internet is to provide maximum availability at acceptable risk levels for Air Force members needing access for the execution of official business." E-mail transmission allows for use of digital imaging to accompany depot maintenance requests.

Overview

1. **Parent Process**: Complete 107 & Submit Req for Assistance
2. **Number of Children**: 0

Actors

2. QA Personnel -
3. Wing P&S Personnel -

Process: Submit 107 to MAJCOM/Depot

Description

4. Occasionally, 107 requests are sent directly to depot without going through proper channels. Proper Procedures for Requesting Depot Maintenance Assistance - Technical assistance requests will be forwarded directly to the depot unless directed by MAJCOM -O& I Level maintenance requests will be forwarded to the MAJCOM for certification -Unprogrammed depot level maintenance requests will be submitted through the MAJCOM for certification Re: T.O. 00-25-107, para 6.1, 6.2, 6.3
5. Send completed 107 and supporting materials to MAJCOM/Depot via FAX, E-Mail, or Base Communication Center.
6. Preferred method of sending request to MAJCOM is via e-mail

Problems/Solutions

3. Problem: When requesting Unprogrammed depot level maintenance assistance, the requirement to use a message is unnecessary. "Messaging" requires use of SARA LITE which has always been awkward and time consuming to use. Current authorized process of e-mail "heads up copy", followed by a formal message is duplication of effort. Use of e-mail would increase the speed of disposition and provide the opportunity to exploit the benefit of digital imaging.
4. Possible solution: AFTO FORM 22 to change TO 00-25-107, para 6.2, to allow e-mail transmission of request in format specified in para 7 based on AFI 33-12.

Overview

1. **Parent Process**: Complete 107 & Submit Req for Assistance
2. **Number of Children**: 0

Actors

3. QA Personnel -

Process: Verify with MAJCOM/Depot Receipt of 107

Description

3. Contact MAJCOM/Depot via Land Line or other means to ensure they received 107.
4. Note: If EMail was used, the Return Receipt capability will automatically provide this functionality.

Problems/Solutions

3. Problem: Lack of automated 107 submission negates quick feedback loop to verify receipt.

Overview

1. **Parent Process**: Complete 107 & Submit Req for Assistance
2. **Number of Children**: 0

Actors

3. QA Personnel -
4. Wing P&S Personnel -

Process: Change Aircraft/Equipment Possession

Description

2. Also must notify MOC/QA/Owning Organization of change.
3. Wing P&S submits AFI 21-103 change of possession purpose identifier message (e.g., BQ - waiting AFMC action/decision).

Trigger

2. Notification of 107 Submission

Problems/Solutions

3. Problem: We are required to report these changes threw CAMS which in turn in sent to REMIS. Do we need to develop another system and duplicate work?
4. Problem: Lack of automated possession change... must be done manually.
5. Solution: Data feed from Air Staff initiative system could provide automated possession change.

Overview

1. **Parent Process**: Prepare & Submit 107 Request
2. **Number of Children**: 0

Actors

5. Wing P&S Personnel -
6. QA Personnel -
7. Maintenance Personnel -
8. MOC - Maintenance Operations Center (Track Status of Aircraft/Equipment/System on a real time basis)

Process: Process 107 Request at MAJCOM

Trigger

2. Receipt of 107 Request

Overview

3. **Parent Process**: Process AFTO 107 Requests for Tech Assist
4. **Number of Children**: 2

Actors

1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

---

Process: Receive 107 at MAJCOM

Description

2. AFTO 107 submitted by Wing is received at MAJCOM by either through E-mail or FAX.

Trigger

2. Receipt of 107 Request

Overview

2. **Parent Process**: Process 107 Request at MAJCOM
3. **Number of Children**: 0

Actors

3. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

---

Process: Evaluate 107 Request

Description

1. Ensure necessary information is included to help engineers determine repair disposition
2. Validate Date Time Group on Official Message is correct

Overview

2. **Parent Process**: Process 107 Request at MAJCOM
3. **Number of Children**: 3

Actors

3. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

---

Process: Validate 107

Description

3. Validate Date Time Group is correct

Overview

1. **Parent Process**: Evaluate 107 Request
2. **Number of Children**: 0

Actors

2. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Research 107

Description

2. Make sure all necessary information is included on the message to help engineers make proper repair disposition

Overview

3. **Parent Process**: Evaluate 107 Request
4. **Number of Children**: 0

Actors

1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Request Additional Information from Unit

Description

2. If necessary, request additional information from the field (e.g., pictures or diagrams) to help engineers formulate repair procedures.

Overview

2. **Parent Process**: Evaluate 107 Request
3. **Number of Children**: 0

Actors

3. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Certify funding is available for repair

Description

1. Ensure sufficient DPEM (Depot Purchased Equipment Maintenance) is available to fund repair.

Problems/Solutions

2. Problem: TO 00-25-107, para 6.2 mentions certification by MAJCOM that all resources have been exhausted. It is assumed this certification also considers available funding. Para 6.3, with potentially much higher costs, makes no mention of "certification."
3. Possible solution: AFTO FORM 22 to TO 0-25-107 to standardize these two paragraphs.

Overview

2. **Parent Process**: Evaluate 107 Request
3. **Number of Children**: 1

Actors

3. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Cost estimate pre-certification

Description

1. Air National Guard and AFMC requires cost estimate from the Depot prior to MAJCOM Certification to verify if funds are available
2. AETC occasionally request cost estimate to determine available funding.

Overview

2. **Parent Process**: Certify funding is available for repair
3. **Number of Children**: 0

Actors

2. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Review Cost Prohibitive Estimates

Description

3. Coordinate with Air Staff for possible attrition action if cost to repair exceeds economic limits.

Trigger

1. Extensive damage causing prohibitive cost

Overview

2. **Parent Process**: Certify funding is available for repair
3. **Number of Children**: 0

Actors

3. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Execute 107 Disposition

Description

3. MAJCOM MDS/System Functional Manager coordinates and sends request to depot

Trigger

1. Completion of MAJCOM Evaluation

Overview

2. **Parent Process**: Process 107 Request at MAJCOM
3. **Number of Children**: 1

Actors

2. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

Process: Forward 107 Certification

Description

2. MAJCOM sends 107 Certification Message to depot with CC to unit.

Overview

3. **Parent Process**: Execute 107 Disposition
4. **Number of Children**: 0

Actors

1. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

---

Process: Forward 107 Disapproval

Description

2. Send disapproval to unit with CC to depot. Notify unit to accurately document time taken for an erroneous possession.
3. Note: May be some differences on TO/CC for individual MAJCOMs.

Overview

2. **Parent Process**: Execute 107 Disposition
3. **Number of Children**: 0

Actors

2. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager

---

Process: Process MAJCOM Response at Wing

Description

3. Disseminate to key players MAJCOM's response to the submitted 107.

Trigger

1. Receipt of MAJCOM Response or Request for Additional Information

Overview

2. **Parent Process**: Process AFTO 107 Requests for Tech Assist
3. **Number of Children**: 2

Actors

2. QA Personnel -
3. Wing P&S Personnel -
4. Maintenance Personnel -

Process: Provide Additional Information

Description

3. As requested, provide any additional information to MAJCOM. Contact key players for help.

Trigger

1. MAJCOM Request for Additional Information

Overview

2. **Parent Process**: Process MAJCOM Response at Wing
3. **Number of Children**: 0

Actors

3. Maintenance Personnel -
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
5. QA Personnel -

Process: Review MAJCOM Approval/Disapproval

Description

3. Review the Approval/Disapproval decision from MAJCOM. Request clarification if needed.

Trigger

1. Receipt of MAJCOM Response

Overview

2. **Parent Process**: Process MAJCOM Response at Wing
3. **Number of Children**: 0

Actors

2. QA Personnel -
3. Wing P&S Personnel -
4. Maintenance Personnel -
5. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Submit Msg to reflect Possession Change

Description

2. If 107 disapproved, Wing P&S submits AFI 21-103 message returning system to appropriate possession code effective time of original possession purpose identifier change.

Trigger

3. Receipt MAJCOM Response

Problems/Solutions

1. Problem: We are required to report these transactions through CAMS, then it's sent to REMIS. Do we need to develop another system to duplicate our efforts?
2. Problem: Loss of accurate reporting status due to slow 107 process....need to automate whole process.
3. Solution: use technology used for this teleconferencing process to upgrade the 107 request process. The video and audio links are real time and a formal conclusion can be reached and printed from the computer systems at the close of

the conferencing session. Note: This may not be a very "good" solution if we must rely on the type of teleconferencing capabilities we have seen today!

Overview

4. **Parent Process**: Process MAJCOM Response at Wing
5. **Number of Children**: 0

Actors

2. Wing P&S Personnel -
3. Maintenance Personnel -
4. MOC - Maintenance Operations Center (Track Status of Aircraft/Equipment/System on a real time basis)

Process: Process 107 Request at Depot

Description

2. Receive 107 request from Unit/MAJCOM and prepare repair disposition.

Trigger

3. Receipt of 107 Request

Overview

1. **Parent Process**: Process AFTO 107 Requests for Tech Assist
2. **Number of Children**: 3

Actors

4. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Receive 107 Request at Depot

Description

2. Receive 107 from unit via official formal message, e-mail or fax.

Trigger

2. Receipt of 107 Request

Overview

3. **Parent Process**: Process 107 Request at Depot
4. **Number of Children**: 1

Actors

1. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Log-in 107

Description

4. Receive 107 from unit and log-in to database system and/or manual system.

Overview

2. **Parent Process**: Receive 107 Request at Depot
3. **Number of Children**: 0

Actors

2. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Send Copy of 107 to Engineering

Description

3. A memo requesting repair disposition, including parts list plus any applicable T.O. figure and index, grounding or flying decision, and SOR (Source of repair: CFT/DFT/O&I/PDM/DIM, etc.) is attached to the -107 and sent to engineering via e-mail or fax.

Problems/Solutions

1. Problem: More information required to determine extent of repair needed.
2. Solution: Contact performing work center for more info instead of running it all the way back down the chain.

Overview

4. **Parent Process**: Receive 107 Request at Depot
5. **Number of Children**: 0

Actors

2. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Evaluate and Make Disposition of 107

Description

2. Review 107 and prepare repair disposition. This includes the type of repair, level of repair, status of aircraft (grounded, flyable) or equipment/system, and parts/tooling requirements. Disposition is sent to Depot 107 Program Manager (e.g., LFPLW at WR-ALC) when completed.

Trigger

3. Receipt of 107 from Depot 107 Program Mgt Personnel

Overview

1. **Parent Process**: Process 107 Request at Depot
2. **Number of Children**: 4

Actors

3. Depot Engineering Personnel - Engineering supervisors, secretaries, and engineers at Depot

---

Process: Assign Priority to 107

Description

2. Normally, a 107 request is processed and worked in the order received and no priority is assigned.

3. Under special circumstances, a priority may be assigned to the 107 request and influenced by importance of the aircraft/equipment/system to the mission, input from MAJCOM POCs.

Overview

2. **Parent Process**: Evaluate and Make Disposition of 107
3. **Number of Children**: 0

Actors

3. Depot Supervisor or Lead Engineer -

Process: Assign 107 to Engineer

Description

1. Determine which engineer has the expertise and/or time to work the 107

Overview

2. **Parent Process**: Evaluate and Make Disposition of 107
3. **Number of Children**: 0

Actors

2. Depot Supervisor or Lead Engineer -

Process: Log-in to Tracking Database

Description

3. Log the 107 in to the engineering database

Overview

1. **Parent Process**: Evaluate and Make Disposition of 107
2. **Number of Children**: 0

Actors

2. Depot Supervisor or Lead Engineer -

Process: Prepare Disposition

Description

2. Engineer conducts the necessary research, analysis, design and coordination to prepare the disposition

Overview

3. **Parent Process**: Evaluate and Make Disposition of 107
4. **Number of Children**: 3

Actors

1. Depot Engineering Personnel - Engineering supervisors, secretaries, and engineers at Depot

---

Process: Review 107 Request

Description

2. Assigned engineer receives the 107 request, reads the request and determines the next action.

Overview

2. **Parent Process**: Prepare Disposition
3. **Number of Children**: 0

Actors

2. Depot Engineering Personnel - Engineering supervisors, secretaries, and engineers at Depot

Process: Review Drawings in Data Repository/TOs

Description

3. Detailed drawings are available in the Data Repository and/or TOs and are reviewed as part of the process of developing the repair disposition.

Overview

1. **Parent Process**: Prepare Disposition
2. **Number of Children**: 0

Actors

2. Depot Engineering Personnel - Engineering supervisors, secretaries, and engineers at Depot
3. Depot Supervisor or Lead Engineer -

Process: Request Additional Info from Field

Description

3. Process Name: Request Additional Information from Field
4. After reviewing the 107 request, additional information may be requested from the field unit that submitted the request.

Overview

3. **Parent Process**: Prepare Disposition
4. **Number of Children**: 0

Actors

1. Depot Engineering Personnel - Engineering supervisors, secretaries, and engineers at Depot
2. Depot Supervisor or Lead Engineer -

Process: Develop Repair

Description

2. After all of the information is received and reviewed, a repair plan is developed by the engineer that details what needs to be done and which SOR will accomplish the repair.

Overview

2. **Parent Process**: Prepare Disposition
3. **Number of Children**: 0

Actors

3. Depot Engineering Personnel - Engineering supervisors, secretaries, and engineers at Depot
4. Depot Supervisor or Lead Engineer -

Process: Approve Disposition

Description

1. Supervisory or lead engineer reviews the disposition for technical adequacy.

Overview

2. **Parent Process**: Evaluate and Make Disposition of 107
3. **Number of Children**: 0

Actors

2. Depot Supervisor or Lead Engineer -

Process: Receive MAJCOM Cert/Disapproval

Description

3. Receive MAJCOM Certification or Disapproval.

Trigger

1. Receipt of MAJCOM Certification/Disapproval

Problems/Solutions

2. Problem: Certain MAJCOM's, who provide command certification's/disapprovals via e-mail only, do not appear to have a system to prevent duplication of transmissions between in-house personnel. Sometimes it is not known even if a initial command cert or disapproval has been forwarded.
3. Solution: Develop some sort of data base or manual system central point of reference so that all in-house MAJCOM personnel can determine if a command cert/disapproval has been issued.

Overview

2. **Parent Process**: Process 107 Request at Depot
3. **Number of Children**: 0

Actors

3. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Execute Disposition of 107

Description

1. Carry-out the disposition of the 107. This can include field-level repairs, depot drop-in maintenance, depot-level repair, satisfactory as-is, or repair by contract field team.

Trigger

3. Receipt of Disposition from Depot Engineering Personnel

Overview

2. **Parent Process**: Process 107 Request at Depot
3. **Number of Children**: 5

Actors

3. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Draft/Send Repair Disp Message to Unit

Description

1. Send courtesy copy of engineering repair disposition to unit and MAJCOM via e-mail or fax prior to official message.
2. Prepare and send official formal message to MAJCOM with CC to unit stating the disposition of the repair (type of repair, level of repair, flying status (grounded or flying), and parts/tooling required).
3. If MAJCOM disapproved 107, formal message sent closing 107 action.
4. Preferred method of transmission is through E-Mail

Overview

2. **Parent Process**: Execute Disposition of 107
3. **Number of Children**: 0

Actors

3. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Prepare Costing & Pers Details for DFT

Description

1. Process Name: Prepare Costing and Personnel Details of DFT
2. Determine the cost of the repair, the personnel required, and the number of man-hours to complete the repair. This work is accomplished by the Workload/Planner and is done when a DFT will perform the repair.

Trigger

3. SOR Decision = DFT

Overview

2. **Parent Process**: Execute Disposition of 107
3. **Number of Children**: 0

Actors

3. Depot Workloader/Planner -

Process: Prepare 206 for DFT Deployment

Description

1. Complete the AFLC Form 206 electronically and forward to Program/Funds Control Division (LFC at WR-ALC). The 206 is a Temporary Work Request and vehicle/document that funds the applicable source of repair to repair the aircraft/equipment/system.

Trigger

3. SOR Decision = DFT

Problems/Solutions

2. Problem: Certain MAJCOM's do not provide annual/quarterly funding to depot budget offices causing delays in getting approval in -107's that require non stock listed parts to be manufactured or DFT's to be deployed.

Overview

3. **Parent Process**: Execute Disposition of 107
4. **Number of Children**: 0

Actors

1. Depot 107 Program Mgt Personnel - Example: WR-ALC (LFPLW)

Process: Request Applicable SOR

Description

3. Request the applicable source of repair (SOR) that will complete the repair. The depot field team (DFT) can include personnel from the Combat Logistics Support Squadron (CLSS) or from civilian personnel.
4. Source of Repair (SOR) definitions - Depot field team (DFT), Contract field team (CFT), Organizational and Intermediate (O&I), Program Depot Maintenance (PDM), Drop-In-Maintenance (DIM), Aircraft Damage Repair (ADR).

Overview

2. **Parent Process**: Execute Disposition of 107
3. **Number of Children**: 0

Actors

3. Depot Workloader/Planner -
4. Depot Contract Field Team Program Manage -

Process: Prepare and Ship Tooling

Description

1. Based upon the requirements of the repair, Production Support Branch (e.g., LFPSI at WR-ALC) will assemble and ship required special tooling to the unit.

Overview

2. **Parent Process**: Execute Disposition of 107
3. **Number of Children**: 0

Actors

2. Depot Workloader/Planner -
3. Depot Transportation Personnel -
4. Commercial Carrier - Commercial transportation carrier that ships the tooling to the unit

---

Process: Deploy DFT if applicable

Description

2. Upon verification that all parts and equipment are on-site at the unit, the DFT is deployed via commercial/military air or POV to make the repair. This process only takes place If DFT has been identified as the repair source.

Trigger

3. SOR Decision = DFT

Overview

1. **Parent Process**: Execute Disposition of 107
2. **Number of Children**: 0

Actors

2. Depot Field Team -
3. Depot Workloader/Planner -

Process: Process Depot Response at Wing

Description

2. Review response from Depot and provide additional information, as needed. Follow all instructions received from the Depot. Disposition could require any of the following actions: - Order parts and/or equipment - Complete the repair locally under direction of Depot - Assist as needed in the repair efforts of the Depot Field Team - Perform temporary fix and send to Depot for repairs - Continue operation without repairs, at this time - Permanently remove item from service.

Trigger

2. Receipt of Depot Response or Request for Additional Information

Overview

3. **Parent Process**: Process AFTO 107 Requests for Tech Assist
4. **Number of Children**: 3

Actors

1. Wing P&S Personnel -
2. QA Personnel -
3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
4. Maintenance Personnel -

Process: Notify Work Center of Depot Response

Description

2. Notify work center of any response received from Depot and take appropriate action.

Overview

5. **Parent Process**: Process Depot Response at Wing
6. **Number of Children**: 0

Actors

3. Wing P&S Personnel -
4. QA Personnel -

Process: Lose Possession

Description

1. If 107 approved for aircraft, submit AFI 21-103 message losing possession to depot -DJ possession purpose identifier if you are waiting for a team to arrive, then change it to DM possession purpose identifier when the team arrives.

Overview

2. **Parent Process**: Process Depot Response at Wing
3. **Number of Children**: 0

Process: Provide Additional Information

Description

3. Provide any additional information requested by the Depot. Contact appropriate work center for additional information and submit information to Depot.

Trigger

2. Request for Additional Information

Overview

3. **Parent Process**: Process Depot Response at Wing
4. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. QA Personnel -

3. Wing P&S Personnel -
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Follow Depot Instructions

Description

2. Follow all instructions received from the Depot pertaining to the repair or continued use of the equipment.

Trigger

2. Receipt of Depot Response

Overview

2. **Parent Process**: Process Depot Response at Wing
3. **Number of Children**: 1

Actors

3. Maintenance Personnel -
4. Wing P&S Personnel -
5. QA Personnel -

Process: Order Parts and/or Equipment as Required

Description

1. Research and order any parts and/or equipment required by the Depot or work center to accomplish repair, if not already on hand. Parts may be issued or be backordered and require lots of waiting.

Overview

2. **Parent Process**: Follow Depot Instructions
3. **Number of Children**: 4

Actors

3. Maintenance Personnel -

Process: Research Required Parts and Equipment

Description

3. Find Stock or Part Numbers for the Parts or Equipment by using TO's, FedLog, and/or calling Depot for information.

Overview

1. **Parent Process**: Order Parts and/or Equipment as Required
2. **Number of Children**: 0

Actors

3. Maintenance Personnel -

Process: Prepare & Submit Order for Parts & Equip

Description

2. Prepare necessary documents to order the required parts and/or equipment and submit it to appropriate agencies.
3. Note: Depot may or may not provide parts themselves depending on funding and parts availability (e.g., depot may need to manufacture parts).

Overview

3. **Parent Process**: Order Parts and/or Equipment as Required
4. **Number of Children**: 0

Actors

1. Maintenance Personnel -
2. Supply Personnel -

Process: Receive Ordered Parts and Equipment

Description

3. Receive the Parts/Equipment from Base Supply stock, from other bases, from the manufacturer or from the Depot.

Overview

2. **Parent Process**: Order Parts and/or Equipment as Required
3. **Number of Children**: 0

Actors

2. Maintenance Personnel -
3. Supply Personnel -

Process: Follow up on Backordered Parts/ Equip

Description

3. If the Parts or equipment are not available, then Supply will go to other bases, to the Depot, or to the manufacturer to retrieve them. The owning work center will keep track of the supplies that have not been issued by using a supply document number.

Overview

1. **Parent Process**: Order Parts and/or Equipment as Required
2. **Number of Children**: 0

Actors

2. Maintenance Personnel -
3. Maintenance Personnel from other bases - Maintenance personnel that maintain like acft/equip/systems
4. Supply Personnel -

Process: Notify Depot of Parts/Equipment Receipt

Description

2. Notify Depot when all parts/hardware and applicable tooling/equipment are on site.

Overview

2. **Parent Process**: Order Parts and/or Equipment as Required
3. **Number of Children**: 0

Actors

3. Maintenance Personnel -
4. QA Personnel -
5. Wing P&S Personnel -
6. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Repair Item/Return to Operation

Description

1. Repair aircraft/equipment/system as directed and/or return to operation.

Overview

5. **Parent Process**: Follow Depot Instructions
6. **Number of Children**: 4

Actors

2. Maintenance Personnel -
3. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
4. QA Personnel -

Process: Complete Temp Fix & Send Item to Depot

Description

3. Follow all directions from Depot to accomplish a temporary fix of the problem. Send aircraft/equipment/system to Depot for repair as required by Depot schedule.

Overview

1. **Parent Process**: Repair Item/Return to Operation
2. **Number of Children**: 0

Actors

3. Maintenance Personnel -
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
5. QA Personnel -

Process: Coord Depot Field Team Repair Efforts

Description

2. Process Name: Coordinate Depot Field Team Repair Efforts
3. After the initial meeting, coordinate with Depot, work center and any other shops required on when, where, and how the repair by the Depot Field Team will be accomplished.

Overview

2. **Parent Process**: Repair Item/Return to Operation
3. **Number of Children**: 0

Actors

3. Wing P&S Personnel -
4. QA Personnel -
5. Maintenance Personnel -
6. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
7. Depot Field Team -

Process: Follow Depot Guidance for Local Repair

Description

1. Follow the guidance and repair action received from Depot to accomplish any O&I level repair of the aircraft/equipment/system.

Overview

5. **Parent Process**: Repair Item/Return to Operation
6. **Number of Children**: 0

Actors

2. Maintenance Personnel -
3. QA Personnel -
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)

Process: Continue Operation of Item

Description

2. Follow all guidance received from Depot for continued operation of the 'Satisfactory As-Is' aircraft/equipment/system.

Overview

3. **Parent Process**: Repair Item/Return to Operation
4. **Number of Children**: 0

Actors

1. Wing P&S Personnel -
2. Maintenance Personnel -

Process: Permanently Remove from Service

Description

4. If determination is made that it is not economically feasible to repair, permanently remove aircraft/equipment/system from service.

Overview

2. **Parent Process**: Repair Item/Return to Operation
3. **Number of Children**: 0

Actors

3. Air Staff -
4. MAJCOM Personnel - Mission Design Series (MDS)/System Functional Manager
5. Maintenance Personnel -
6. Wing P&S Personnel -

Process: Prepare & Submit Supp 107 As Reqd

Description

1. If additional discrepancy discovered during repair, prepare and submit supplemental (new) 107 as previously defined.

Trigger

3. Identification of additional discrepancies during repair process

Overview

2. **Parent Process**: Process AFTO 107 Requests for Tech Assist
3. **Number of Children**: 0

Actors

3. Maintenance Personnel -
4. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
5. QA Personnel -
6. Wing P&S Personnel -

Process: Verify 107 Completion

Description

1. Ensure that all maintenance repair actions have been completed and that all documentation is signed.

Trigger

2. Repair action completed

Overview

3. **Parent Process**: Process AFTO 107 Requests for Tech Assist
4. **Number of Children**: 4

Actors

3. QA Personnel -
4. Maintenance Personnel -
5. AFETS - Air Force Engineering Technical Services (by aircraft Major Design Series)
6. Wing P&S Personnel -

Process: Inspect Repair by QA

Description

1. QA inspector checks repair work to ensure that all required work/repair has been completed in a satisfactory manner and all required documentation is completed. Arrive at an acceptable solution if repair is not acceptable.

Problems/Solutions

3. Problem: There is no step for QA to inspect repair before the depot team is released by the owning unit.
4. Solution: Add QA Inspector block to maintenance completion form used to 'sell' aircraft back to owning work center alongside the Repair Technician's signature. This will help resolve the problem of Wing P&S not being notified by QA upon completion.

Overview

2. **Parent Process**: Verify 107 Completion
3. **Number of Children**: 0

Actors

3. QA Personnel -

Process: Review Repair Documentation

Description

1. Review appropriate repair documentation. Maintain copy for Base Historical records.

Overview

3. **Parent Process**: Verify 107 Completion
4. **Number of Children**: 0

Actors

2. QA Personnel -
3. Wing P&S Personnel -

Process: Notify Wing P&S of Completion

Description

3. QA should notify Wing P&S or other appropriate 107 POC of completion of 107 repair so they can gain possession of the aircraft.

Problems/Solutions

1. Problem: Many times the team is on its way home before Wing is notified the process is completed. This causes a laps in time of reporting possession changes to HQ resulting in erroneous information at that level.
2. Solution: QA notify Wing P & S when the process is completed

Overview

3. **Parent Process**: Verify 107 Completion
4. **Number of Children**: 0

Process: Notify MAJCOM/Depot of Completion

Description

2. Note: This is currently not being done by the Wing with regularity.
3. Send final message to MAJCOM/Depot of completion of the work outlined in the 107.

Overview

3. **Parent Process**: Verify 107 Completion
4. **Number of Children**: 0

Actors

1. QA Personnel -
2. Wing P&S Personnel -

Process: Submit Msg to reflect Possession Change

Description

4. Wing P&S submits AFI 21-103 message to return aircraft/equipment/system to owning unit possession.

Overview

2. **Parent Process**: Verify 107 Completion
3. **Number of Children**: 0

Actors

3. Wing P&S Personnel -
4. MOC - Maintenance Operations Center (Track Status of Aircraft/Equipment/System on a real time basis)
5. Maintenance Personnel -
6. QA Personnel -

AFTO 107 Problem/Solution Action List (Categorizer)

1. Air Staff initiate and fund state of the art real-time AFTO 107 system

2. Establish a Worldwide 107 conference

Can't happen at the F-15 maintainers conference

Air Staff will chair this conference

Who will chair such a conference? I suggest Jim McManus!

Could be rotated by MAJCOM's on chairing

3. Evaluate current B-1 web-based system and see if it can be adapted to other systems.

Please send e-mail to Steven Kidd as to who is responsible for this system and the URL so he can access the system.

4. Develop a system to promote the use of cross-tells to share repair ideas

5. Establish one central point of contact with subject matter expertise for the particular system at the Wing

6. Standardize the single point of contact via the TO or MAJCOM supplements

7. Recommend changes to TO 107 in regard to 107 content required

8. Add additional detail to the actual TO describing the specific format for each paragraph that must be submitted

9. Develop web-based forms for submittal of 107 requests

Process Modeler Tool Ease of Use

1. Learning to operate the Process Modeler tool was easy for me.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*3*
A(4)	*8*
N(3)	*1*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*A(4.17)*
STD	*0.58*

2. I found it easy to get the Process Modeler tool to do what I wanted it to do.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*5*
A(4)	*6*
N(3)	*1*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*A(4.33)*
STD	*0.65*

3. My interactions with the Process Modeler tool were clear and understandable.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*6*
A(4)	*5*
N(3)	*1*

D(2)	*0*
SD(1)	*0*
Statistics	
Mean	*A(4.42)*
STD	*0.67*

4. I found the Process Modeler tool flexible to interact with.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*5*
A(4)	*5*
N(3)	*2*
D(2)	*0*
SD(1)	*0*
Statistics	
Mean	*A(4.25)*
STD	*0.75*

5. It was easy for me to become skillful at using the Process Modeler tool.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	Count
SA(5)	*4*
A(4)	*7*
N(3)	*1*
D(2)	*0*
SD(1)	*0*
Statistics	
Mean	*A(4.25)*
STD	*0.62*

6. Interacting with the Process Modeler tool did not require a lot of mental effort.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*4*
A(4)	*8*

N(3)	*0*
D(2)	*0*
SD(1)	*0*
Statistics	
Mean	*A(4.33)*
STD	*0.49*

7. I found the Process Modeler tool easy to use.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	Count
SA(5)	*3*
A(4)	*8*
N(3)	*1*
D(2)	*0*
SD(1)	*0*
Statistics	
Mean	*A(4.17)*
STD	*0.58*

8. If you participated in the earlier meeting, did the changes in the Process Modeler tool improve its ease of use?
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*3*
A(4)	*2*
N(3)	*6*
D(2)	*0*
SD(1)	*0*
Statistics	
Mean	*A(3.73)*
STD	*0.90*

9. What changes would you recommend to improve the ease of use of the Process Modeler tool? (Open-Ended)

1. none

2. My computer did not update all of the information, I had to use another members monitor to participate in the discussion.
3. NO real changes, I found it easy to use.
4. Add mini pop-up help notes that appear when you place the cursor over a tool bar icon
- Add same for showing the entire description of a node when the cursor is placed over it, vice having to scroll across
- Add the ability to drag nodes in the process tree
- Add a graphical depiction of the process/decision tree and the ability to click on it to jump to that node of the process

Overall Assessment of the Process Modeler Tool

10. What did you like least about the Process Modeler tool? (Open-Ended)

1. The loss of capability when network went down

11. What did you like best about the Process Modeler tool? (Open-Ended)

1. It's ease of use
2. It is easy to use and great to be able to see others comments at the same time,
3. ease of use

12. If you could change only one thing in the Process Modeler tool, what would you tell the designers to change? (Open-Ended)

1. Nothing
2. Nothing

AFTO 107 Process Model Quality

13. The overall quality of the AFTO 107 process model developed was:
Excellent (E), Very Good (VG), Good (G), Fair (F), Poor (P)

Choices	*Count*
E(5)	*3*
VG(4)	*8*
G(3)	*1*
F(2)	*0*
P(1)	*0*

Statistics	
Mean	*VG(4.17)*

STD	*0.58*

14. The overall quality of the recommended improvements to the AFTO 107 process identified were:
Excellent (E), Very Good (VG), Good (G), Fair (F), Poor (P)

Choices	*Count*
E(5)	*4*
VG(4)	*5*
G(3)	*3*
F(2)	*0*
P(1)	*0*
Statistics	
Mean	*VG(4.08)*
STD	*0.79*

15. Personnel involved in the 107 Process could easily understand the meaning of the process model developed with a minimum amount of explanation.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*6*
A(4)	*6*
N(3)	*0*
D(2)	*0*
SD(1)	*0*
Statistics	
Total	*54*
Mean	*SA(4.50)*
STD	*0.52*

16. The process model developed was:
Completely Correct (CC), Mostly Correct (MC), Average (A), Somewhat Incorrect (SI), Mostly Incorrect (MI)

Choices	*Count*
CC(5)	*2*
MC(4)	*10*
A(3)	*0*
SI(2)	*0*
MI(1)	*0*

Statistics

Mean	*MC(4.17)*
STD	*0.39*

17. The process model developed was:
    Very Complete (VC), Mostly Complete (MC), Average (A), Somewhat Incomplete (SI), Very Incomplete (VI)

Choices	*Count*
VC(5)	*3*
MC(4)	*8*
A(3)	*1*
SI(2)	*0*
VI(1)	*0*

Statistics	
Mean	*MC(4.17)*
STD	*0.58*

18. The process descriptions developed were:
    Very Clear (VC), Mostly Clear (MC), Average (A), Somewhat Vague (SV), Very Vague (VV)

Choices	*Count*
VC(5)	*3*
MC(4)	*9*
A(3)	*0*
SV(2)	*0*
VV(1)	*0*

Statistics	
Mean	*MC(4.25)*
STD	*0.45*

19. How satisfied were you with the final AFTO 107 process model?
    Very Satisfied (VS), Mostly Satisfied (MS), Average (A), Somewhat Unsatisfied (SU), Very Unsatisfied (VU)

Choices	*Count*
VS(5)	*4*
MS(4)	*8*
A(3)	*0*
SU(2)	*0*
VU(1)	*0*

Statistics	
Mean	*MS(4.33)*
STD	*0.49*

20. How satisfied were you with the recommended AFTO 107 process improvements?
Very Satisfied (VS), Mostly Satisfied (MS), Average (A), Somewhat Unsatisfied (SU), Very Unsatisfied (VU)

Choices	*Count*
VS(5)	*6*
MS(4)	*4*
A(3)	*2*
SU(2)	*0*
VU(1)	*0*

Statistics	
Mean	*MS(4.33)*
STD	*0.78*

Distributed Meeting Assessment

21. Having representatives participate from both locations improved the quality of the AFTO 107 process model.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*12*
A(4)	*0*
N(3)	*0*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*SA(5.00)*
STD	*0.00*

22. Having representatives participate from both locations improved the quality of the recommended AFTO 107 process improvements.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*11*
A(4)	*1*
N(3)	*0*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*SA(4.92)*
STD	*0.29*

23. Representatives from both meeting locations participated equally.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*6*
A(4)	*6*
N(3)	*0*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*SA(4.50)*
STD	*0.52*

24. Working with other meeting participants at my location was:
Very Easy (VE), Easy (E), Average (A), Difficult (D), Very Difficult (VD)

Choices	*Count*
VE(5)	*7*
E(4)	*4*
A(3)	*1*
D(2)	*0*
VD(1)	*0*

Statistics	
Mean	*VE(4.50)*
STD	*0.67*

25. Working with meeting participants at the other location was:
Very Easy (VE), Easy (E), Average (A), Difficult (D), Very Difficult (VD)

Choices	*Count*
VE(5)	*4*
E(4)	*2*
A(3)	*4*
D(2)	*1*
VD(1)	*1*

Statistics

Mean	*E(3.58)*
STD	*1.31*

26. My meeting location was:

[9] Mountain Home AFB
[3] Warner Robins ALC

Overall Meeting Approach

27. Using this approach to define/improve the AFTO 107 process enabled me to accomplish this task quickly.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*5*
A(4)	*5*
N(3)	*2*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*A(4.25)*
STD	*0.75*

28. I spent my time efficiently describing the AFTO 107 process.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*5*
A(4)	*5*
N(3)	*2*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*A(4.25)*
STD	*0.75*

29. The meeting approach allowed me to everything I needed to do to define/improve the AFTO 107 process.
SA-Strongly Agree A-Agree N-Neutral D-Disagree SD-Strongly Disagree

Choices	*Count*
SA(5)	*5*
A(4)	*6*
N(3)	*1*
D(2)	*0*
SD(1)	*0*

Statistics	
Mean	*A(4.33)*
STD	*0.65*

30. How could the approach followed in the meeting to define/improve the AFTO 107 process be improved? (Open-Ended)

1. Better LAN connectivity
2. Improve connectivity between bases, i.e. loss of video and lack of audio quality
3. The only problem was losing the internet but other than that it is a great approach
4. Get all the MAJCOMS involved.
5. The video conferencing link we had with Robins was not all that it should have been
to facilitate a good conference. The Internet link at Robins did not allow us constant
access to them. The Internet at Robins kept dumping them - forcing telephone speakerphone discussions that did not allow us good communications. The software
was excellent, but the connection to Robins was weak.

31. How satisfied were you with the overall meeting approach?
Very Satisfied (VS), Mostly Satisfied (MS), Average (A), Somewhat Unsatisfied (SU), Very Unsatisfied (VU)

Choices	*Count*
VS(5)	*4*
MS(4)	*7*
A(3)	*1*
SU(2)	*0*
VU(1)	*0*

Statistics	
Mean	*MS(4.25)*
STD	*0.62*

32. How satisfied were you with the overall meeting outcome?

Very Satisfied (VS), Mostly Satisfied (MS), Average (A), SomewhatUnsatisfied (SU), Very Unsatisfied (VU)

Choices	*Count*
VS(5)	*2*
MS(4)	*9*
A(3)	*1*
SU(2)	*0*
VU(1)	*0*

Statistics	
Mean	*MS(4.08)*
STD	*0.51*

Demographics

33. How many years have you been working for the military (combined active duty and civilian time)? *Assign a number.*

Value	*Count*
12	*1*
13	*1*
15	*1*
16	*1*
18	*1*
20	*2*
22	*2*
23	*1*
26	*1*
32	*1*

Statistics	
Mean	*19.92*
STD	*5.68*

34. How many years have you been working with the AFTO 107 Process? *Assign a number.*

Spread Value	*Count*
2	*3*
3	*1*
4	*1*
5	*1*
11	*2*
12	*2*

15	*1*
23	*1*

Statistics

Mean	*8.50*
STD	*6.60*

35. How often do you use a computer?

[11] Several times each day
[0] Once a day
[1] Several times each week
[0] Once a week
[0] Rarely

36. How would you rate your expertise with use of Internet Browsers?
Excellent (E), Very Good (VG), Good (G), Fair (F), Poor (P)

Choices	Count
E(5)	*3*
VG(4)	*5*
G(3)	*3*
F(2)	*1*
P(1)	*0*

Statistics

Mean	*VG(3.83)*
STD	*0.94*

37. Before this meeting, how many times had you used GroupSystems?

[1] Many times
[3] 2 -3 times
[2] 1 time
[6] Never

38. Before this meeting, how many times had you used the Process Modeler tool?

[0] Many times
[0] 2 -3 times
[4] 1 time
[8] Never

39. Before this meeting, how many times had you developed a process, activity, or

similar type model?

[0] Many times
[2] 2 -3 times
[4] 1 time
[6] Never

APPENDIX C – MEETING 3 OUTPUT

Meeting 3 Output

AFTO 107 Problem/Solution Action List

1. Air Staff initiate and fund state of the art real-time AFTO 107 system
2. Establish a Worldwide 107 conference

Can't happen at the F-15 maintainers conference {1/13/99, 12:58 PM}
Air Staff will chair this conference {11/6/98, 11:08 AM}
Who will chair such a conference? I suggest Jim McManus! {11/6/98, 11:09 AM}
Could be rotated by MAJCOM's on chairing {11/6/98, 11:54 AM}

3. Evaluate current B-1 web-based system and see if it can be adapted to other systems.

Please send e-mail to Steven Kidd as to who is responsible for this system and the URL so he can access the system. {11/6/98, 11:18 AM}

4. Develop a system to promote the use of cross-tells to share repair ideas
5. Establish one central point of contact with subject matter expertise for the particular system at the Wing
6. Standardize the single point of contact via the TO or MAJCOM supplements
7. Recommend changes to TO 107 in regard to 107 content required
8. Add additional detail to the actual TO describing the specific format for each paragraph that must be submitted
9. Develop web-based forms for submittal of 107 requests
10. Develop a data base to view previous 107 problems and solutions

Parking Lot (General Comment)

1. Was briefed at last base communications update meeting that all message traffic will be via e-mail by end of 1999 and that Sarah Lite message format will be discontinued....this will force a change to the standard reporting method/format for all AFTO 107s...could be opportunity to get this proposal a standard way of submittal of AFTO 107s.

Vote on Importance of AFTO 107 Problem/Solution Action List Items

Participant Instructions

Please assign a level of importance to each of the ten items in the list. A 10 would indicate very important, a 1 would indicate no importance. When you have completed your vote, click on the "Ballot Box" button to submit your vote.

Voting Results

10-Point Scale (Allow bypass)
Number of ballot items: 10
Total number of voters (N): 8 (7 voted, 1 abstained)

Mean	
9.57	1. Establish one central point of contact with subject matter expertise for the particular system at the Wing
8.71	2. Standardize the single point of contact via the TO or MAJCOM supplements
8.29	3. Air Staff initiate and fund state of the art real-time AFTO 107 system
8.00	4. Develop a system to promote the use of cross-tells to share repair ideas
7.86	5. Develop web-based forms for submittal of 107 requests
7.86	6. Recommend changes to TO 107 in regard to 107 content required
7.86	7. Add additional detail to the actual TO describing the specific format for each paragraph that must be submitted
7.71	8. Develop a data base to view previous 107 problems and solutions
7.43	9. Establish a Worldwide 107 conference
6.57	10. Evaluate current B-1 web-based system and see if it can be adapted to other systems.

Number of Votes in Each Rating

	10	9	8	7	6	5	4	3	2	1
1. Establish one central POC	5	1	1	0	0	0	0	0	0	0
2. Standardize single POC	4	0	1	1	1	0	0	0	0	0
3. Air Staff fund real-time sys	2	2	1	0	2	0	0	0	0	0
4. Develop sys to promote crosstell	2	1	1	1	2	0	0	0	0	0
5. Develop web-based forms	0	2	3	1	1	0	0	0	0	0
6. Recommend TO changes	2	0	2	1	2	0	0	0	0	0
7. Add detail on specific form	2	2	0	1	1	0	1	0	0	0
8. Develop a 107 database	2	1	0	2	1	1	0	0	0	0
9. Establish WW 107 conference	1	3	1	0	0	1	0	0	1	0
10. Evaluate B-1 web system	0	1	2	1	2	0	0	0	1	0

	Total	STD	n
1. Establish one central POC	67	0.79	7

Appendix C

2. Standardize single POC	61	1.70	7
3. Air Staff fund real-time sys	58	1.70	7
4. Develop sys to promote crosstells	56	1.73	7
5. Develop web-based forms	55	1.07	7
6. Recommend TO changes	55	1.68	7
7. Add detail on specific form	55	2.27	7
8. Develop a 107 database	54	1.98	7
9. Establish WW 107 conference	52	2.88	7
10. Evaluate B-1 web system	46	2.30	7

Vote on Feasibility of AFTO 107 Problem/Solution Action List Items

Participant Instructions

Please assign a level of feasibility to each of the ten items in the list indicating how likely you feel the item would be implemented. A 10 would indicate very likely to be implemented, a 1 would indicate no chance of being implemented. When you have completed your vote, click on the "Ballot Box" button to submit your vote.

Voting Results

10-Point Scale (Allow bypass)
Number of ballot items: 10
Total number of voters (N): 5

Mean	
9.20	1. Establish one central point of contact with subject matter expertise for the particular system at the Wing
8.60	2. Standardize the single point of contact via the TO or MAJCOM supplements
8.40	3. Add additional detail to the actual TO describing the specific format for each paragraph that must be submitted
8.40	4. Develop a system to promote the use of cross-tells to share repair ideas
8.20	5. Recommend changes to TO 107 in regard to 107 content required
8.00	6. Develop web-based forms for submittal of 107 requests
8.00	7. Develop a data base to view previous 107 problems and solutions
7.80	8. Evaluate current B-1 web-based system and see if it can be adapted to other systems.
7.40	9. Establish a Worldwide 107 conference
6.60	10. Air Staff initiate and fund state of the art real-time AFTO 107 system

Number of Votes in Each Rating

	10	9	8	7	6	5	4	3	2	1

1. Establish one central POC	2	2	1	0	0	0	0	0	0	0
2. Standardize single POC	2	1	1	0	1	0	0	0	0	0
3. Add detail on specific form	2	0	1	2	0	0	0	0	0	0
4. Develop sys to promote crosstell	3	0	0	1	0	1	0	0	0	0
5. Recommend TO changes	2	0	1	1	1	0	0	0	0	0
6. Develop web-based forms	1	1	2	0	0	1	0	0	0	0
7. Develop a 107 database	2	1	0	1	0	0	1	0	0	0
8. Evaluate B-1 web system	2	1	1	0	0	0	0	0	1	0
9. Establish WW 107 conference	1	1	2	0	0	0	0	0	1	0
10. Air Staff fund real-time sys	1	1	1	0	0	0	1	0	1	0

	Total	STD	n
1. Establish one central POC	46	0.84	5
2. Standardize single POC	43	1.67	5
3. Add detail on specific form	42	1.52	5
4. Develop sys to promote crosstells	42	2.30	5
5. Recommend TO changes	41	1.79	5
6. Develop web-based forms	40	1.87	5
7. Develop a 107 database	40	2.55	5
8. Evaluate B-1 web system	39	3.35	5
9. Establish WW 107 conference	37	3.13	5
10. Air Staff fund real-time sys	33	3.44	5

Ballot Items in Original Order

1. Air Staff initiate and fund state of the art real-time AFTO 107 system
2. Establish a Worldwide 107 conference
3. Evaluate current B-1 web-based system and see if it can be adapted to other systems.
4. Develop a system to promote the use of cross-tells to share repair ideas
5. Establish one central point of contact with subject matter expertise for the particular system at the Wing
6. Standardize the single point of contact via the TO or MAJCOM supplements
7. Recommend changes to TO 107 in regard to 107 content required
8. Add additional detail to the actual TO describing the specific format for each paragraph that must be submitted
9. Develop web-based forms for submittal of 107 requests
10. Develop a data base to view previous 107 problems and solutions